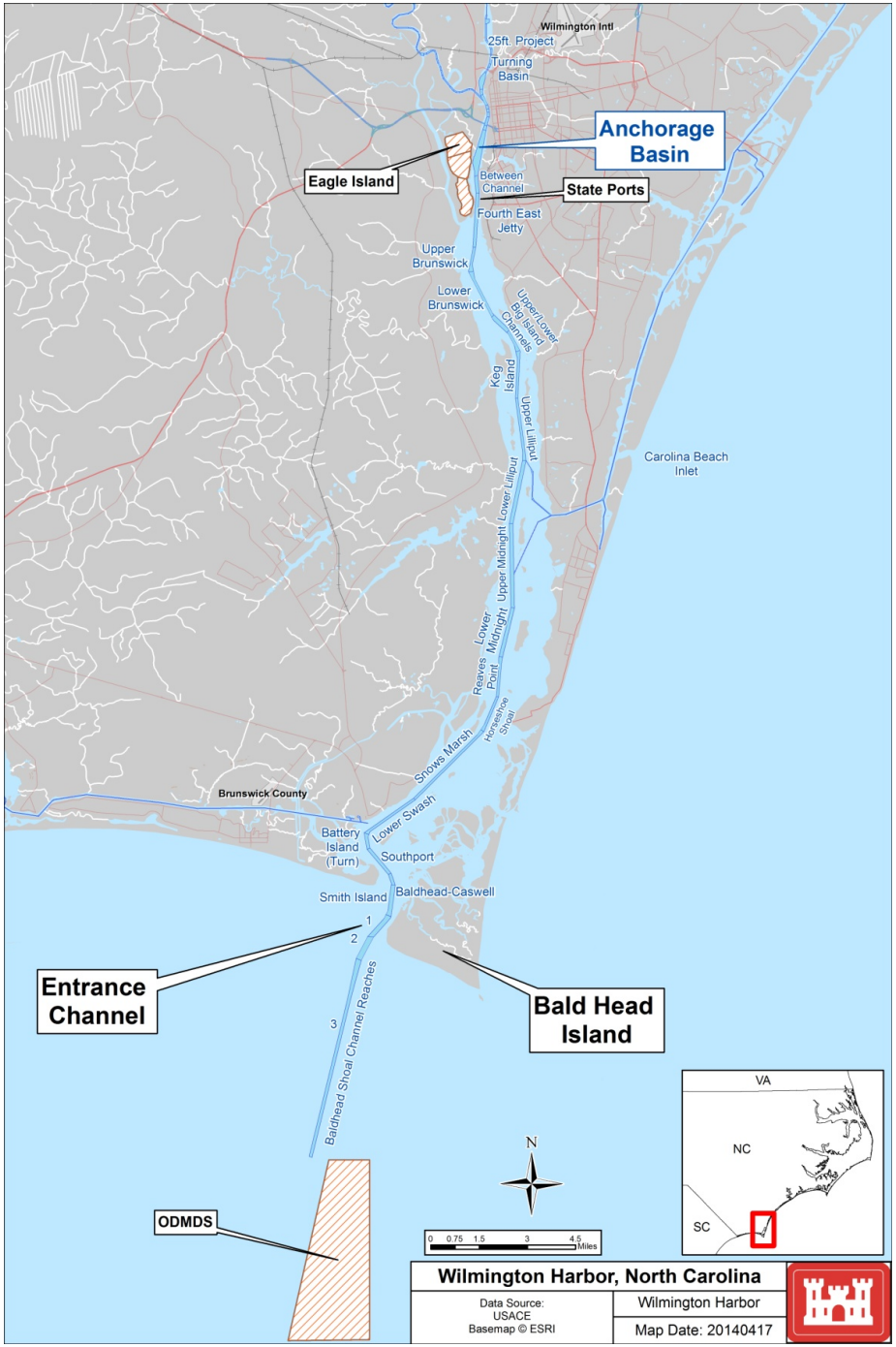
Wilmington Harbor
Navigation Improvement Project

Stakeholders Meeting
18 December 2019

Proposed Project

- -47 feet MLLW: Anchorage Basin to Lower Swash
- -49 feet MLLW: Battery Island to Entrance


Wilmington Intl
25ft. Project
Turning
Basin
Anchorage
Basin
Eagle Island
Between
Channel
State Ports
Fourth East
Jetty
Upper
Brunswick
Lower
Brunswick
Upper/Lower
Bal Island
Channels
Keg
Island
Upper Lilliput
Carolina Beach
Inlet
Lower Lilliput
Upper Midnight
Lower
Midnight
Reaves
Point
Horseshoe
Shoal
Snows Marsh
Brunswick County
Lower Swash
Battery
Island
(Turn)
Southport
Smith Island
Baldhead-Caswell
1
2
3
Entrance
Channel
Bald Head
Island
Baldhead Shoal Channel Reaches
ODMDS
N
0 0.75 1.5 3 4.5
Miles
VA
NC
SC
Wilmington Harbor, North Carolina
Data Source:
USACE
Basemap © ESRI
Wilmington Harbor
Map Date: 20140417

Design Vessels

Attribute	12,400 TEU Container Vessel	8,000 TEU Container Vessel
Design Vessel	MSC Lauren	CMA CGM Hugo
LOA (ft)	1,200	1,096
LBP (ft)	1,148	1,047
Beam (ft)	158.8	140.4
Maximum Loaded Draft [ft]	49	48
Modeled Draft [ft]	43	38

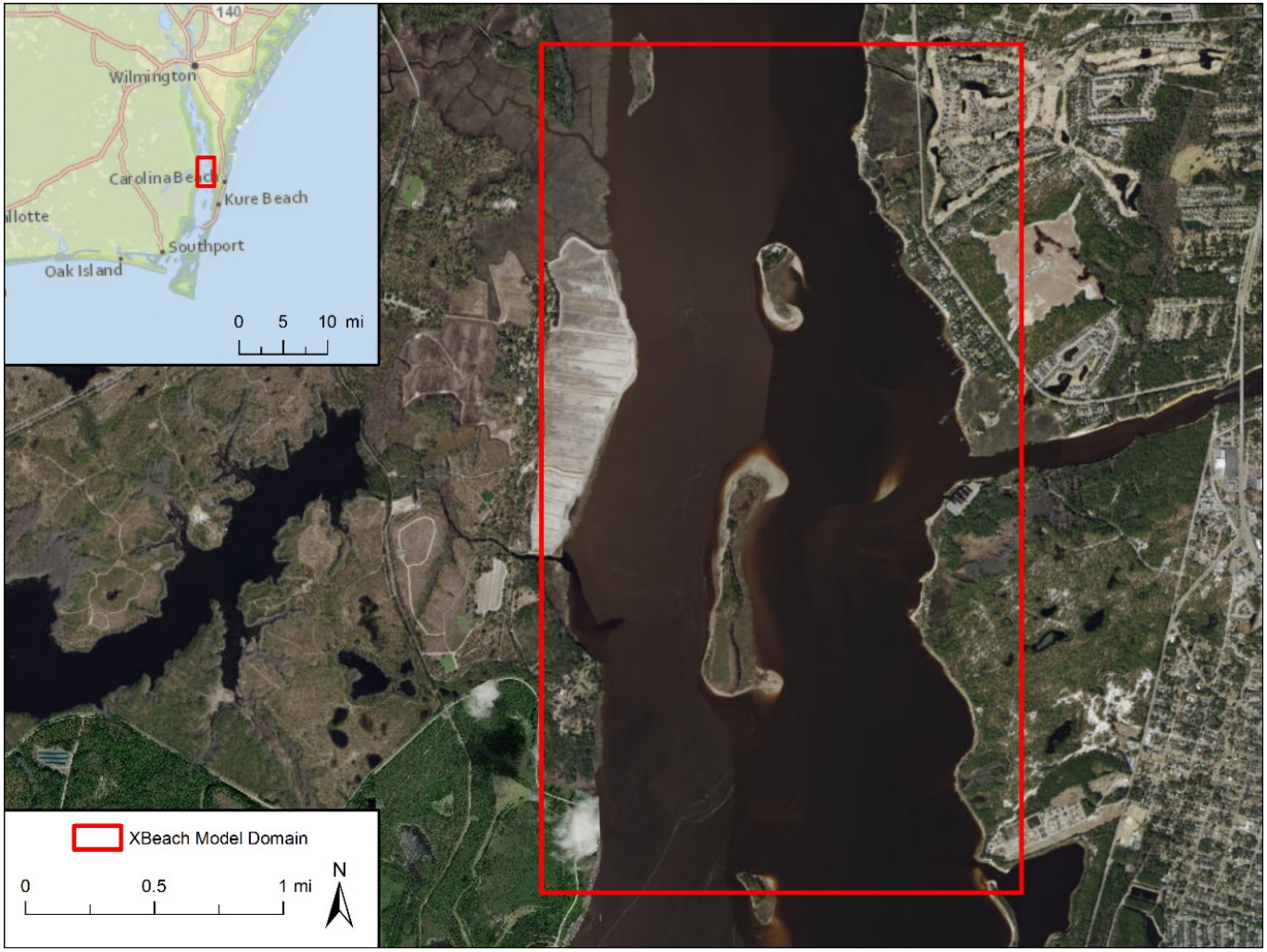
Existing and Proposed Channel Widths

Port of Wilmington

ID	Range Name	Channel Widths [ft]		Widening Details
		Existing Channel	Proposed	
0	Entrance	N/A	600	New
1	Bald Head Shoal Reach 3	500 - 900	600 - 900	Symmetric
2	Bald Head Shoal Reach 2	900	900	No Change
3	Bald Head Shoal Reach 1	700	900	Green Side Only
4	Smith Island	650	900	Red Side Only
5	Bald Head - Caswell	500	800	Red Side Only
6	Southport	500	800	Re-orientation Red Side then Green Side
7	Battery	500	800 - 1300	Replaced with 4000-ft Radius Curve - And Green Side at Apex
8	Lower Swash	400	800 - 500	Green Side to Symmetric
9	Snows Marsh	400	500	Symmetric
10	Horseshoe Shoal	400	500	Symmetric
11	Reaves Point	400	500	Symmetric
12	Lower Midnight	600	600	No Change
13	Upper Midnight	600	600	No Change
14	Lower Lilliput	600	600	No Change
15	Upper Lilliput	400	500	Symmetric
16	Keg Island	400	500	Symmetric
17	Lower Big Island	400	500	Symmetric
18	Upper Big Island	660	660	No Change
19	Lower Brunswick	400	500	Symmetric
20	Upper Brunswick	400	500	Symmetric
21	Fourth East Jetty	500	550	Green Side Only

Model Domain

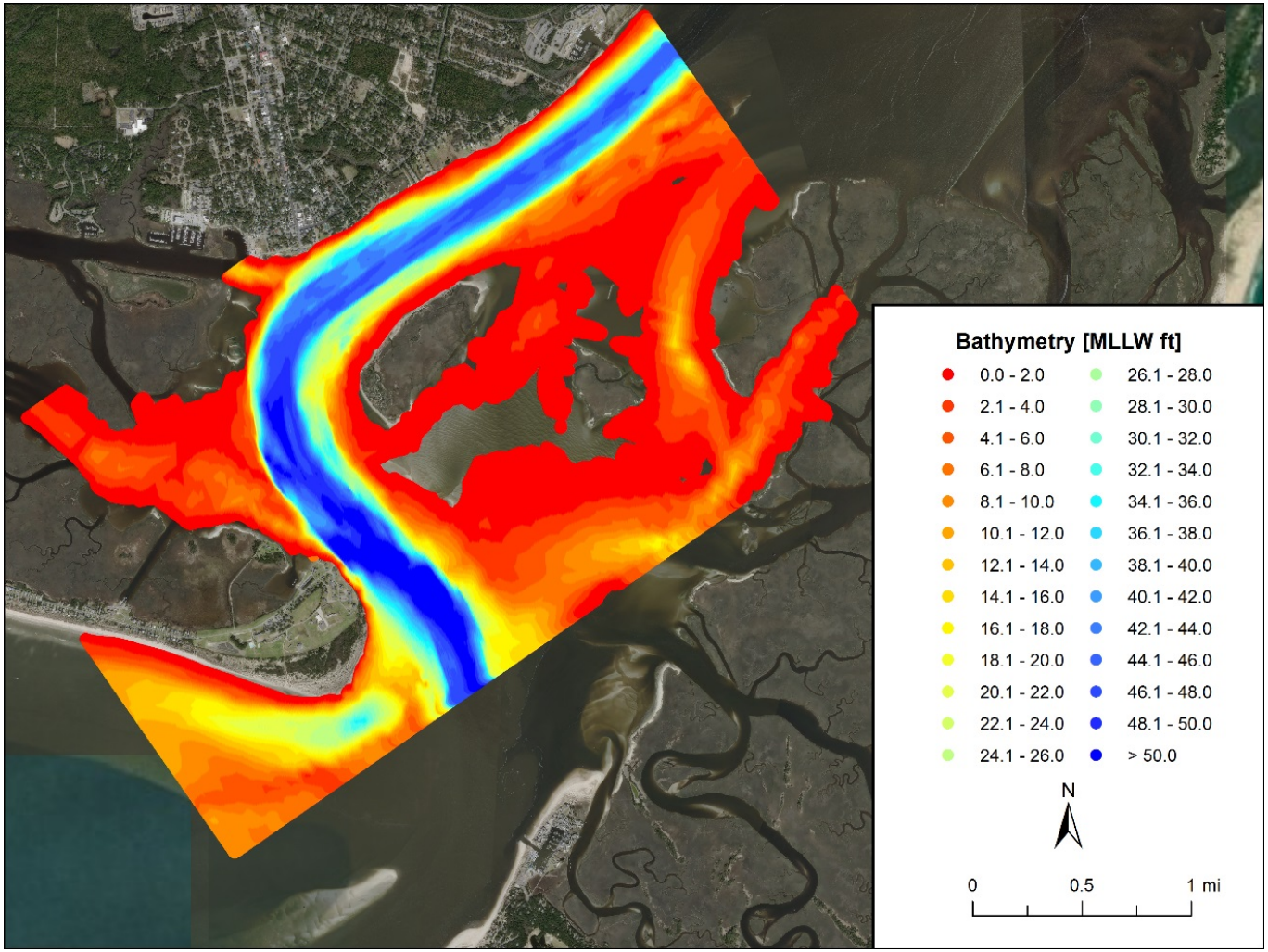
Model Domain



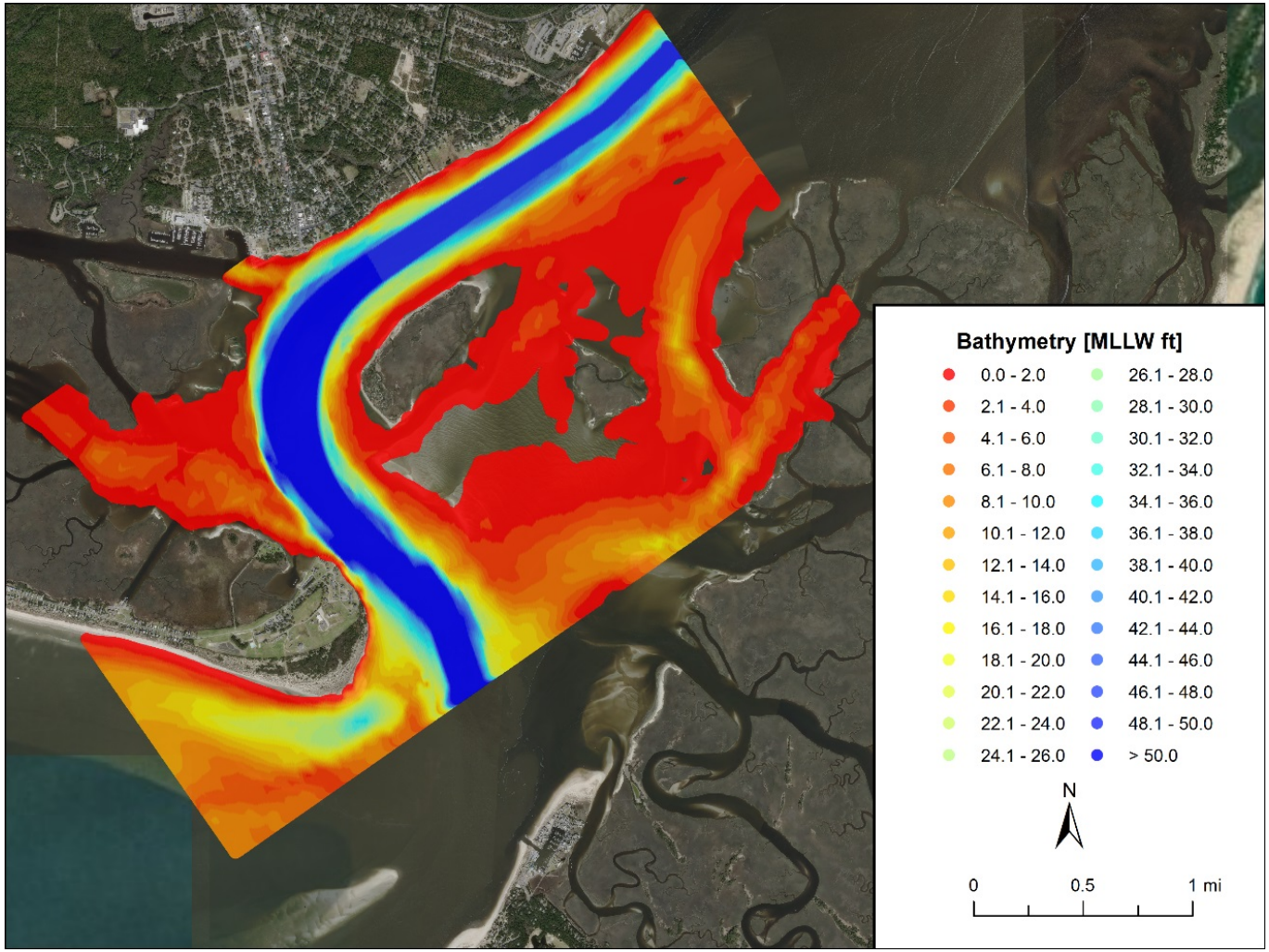
Proposed & Existing Navigation Channels

Navigation Channel

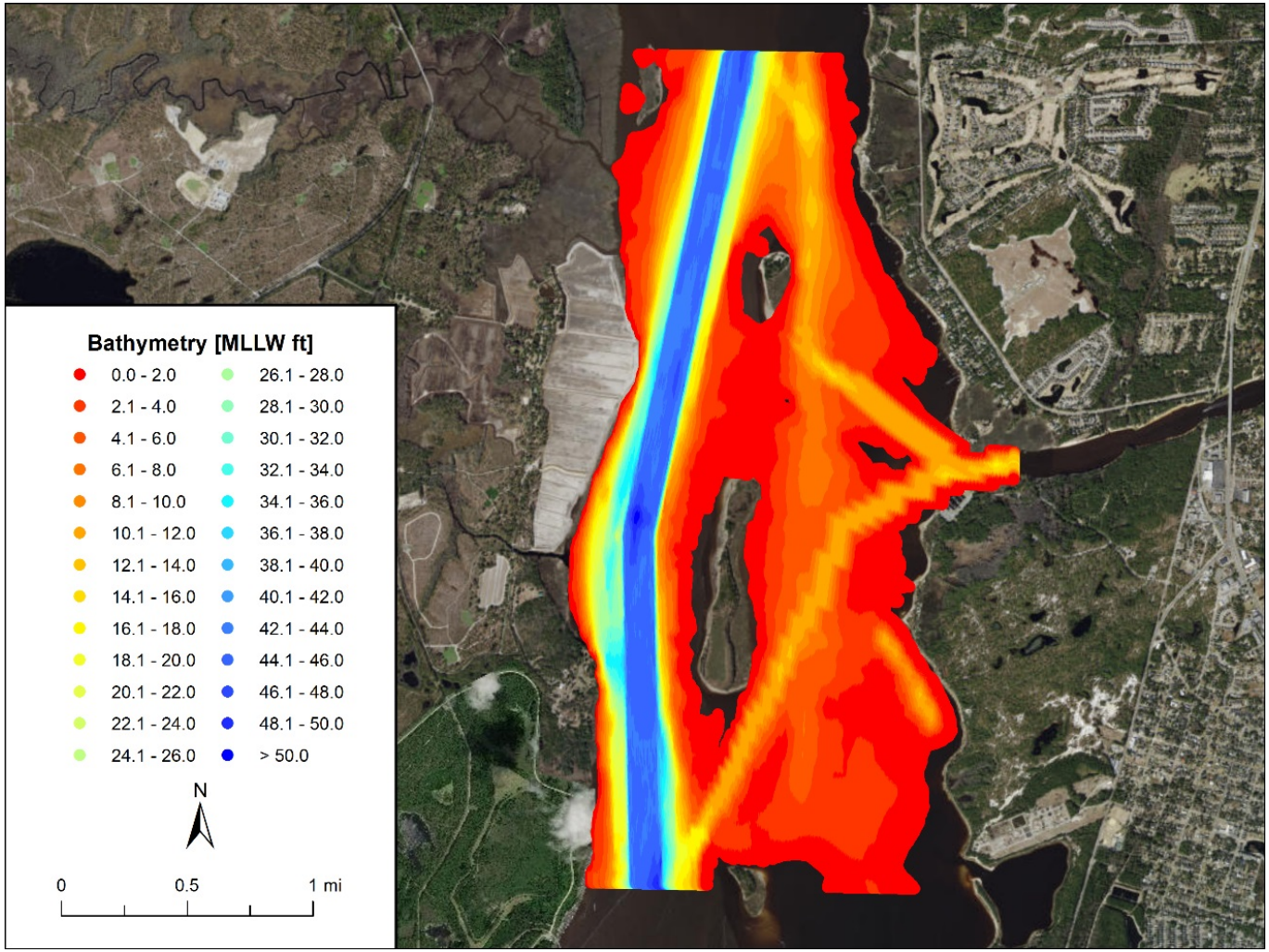
Existing Channel Bathymetry



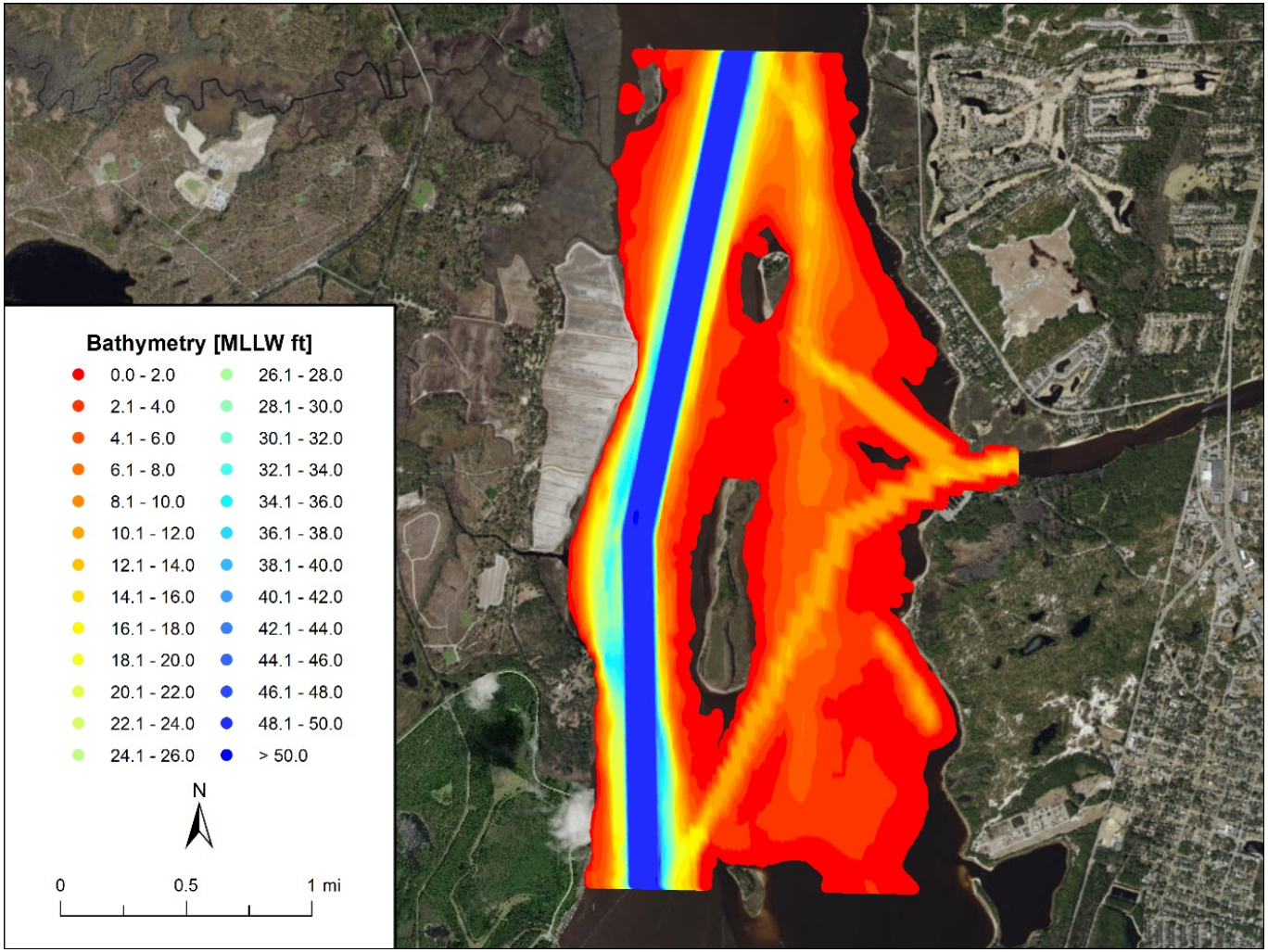
Design Channel Bathymetry



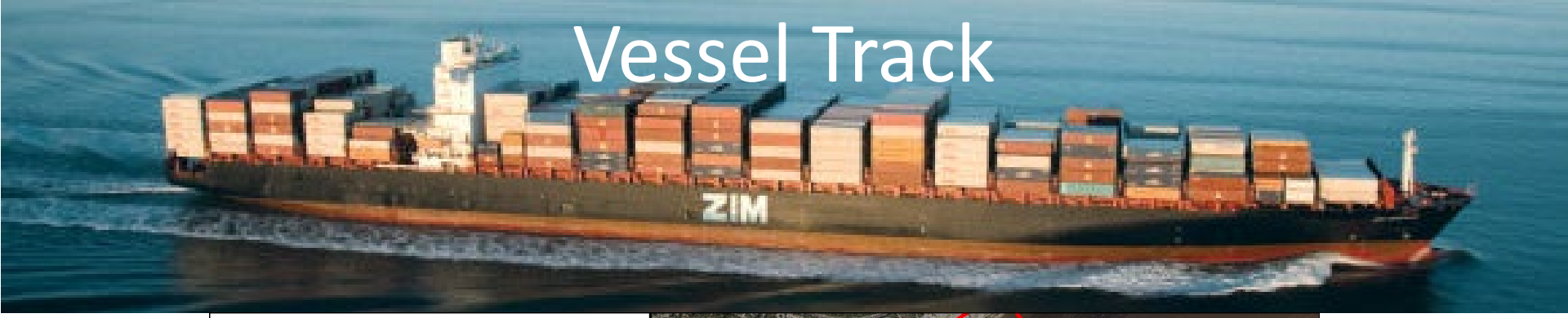
Existing Channel Bathymetry



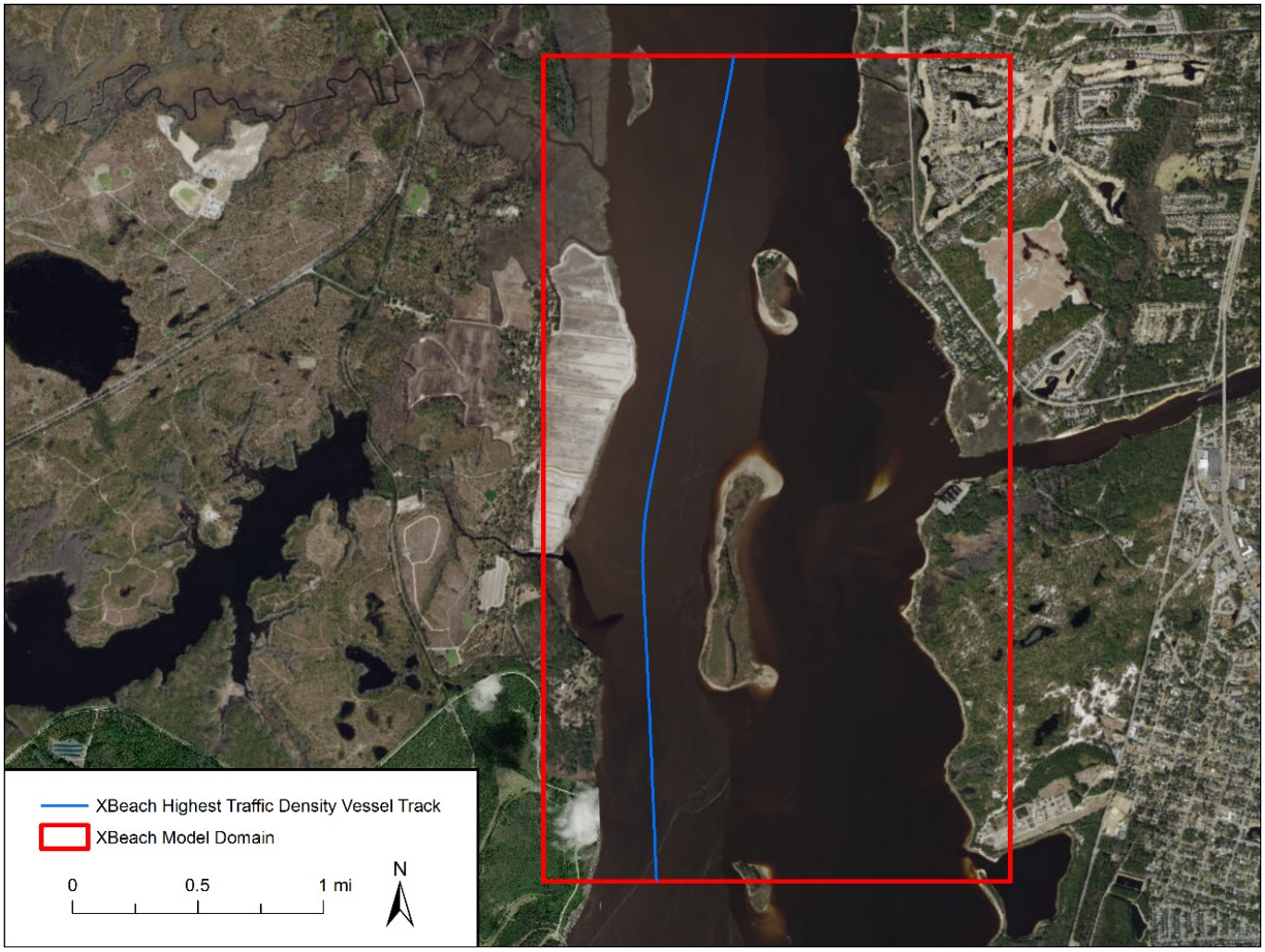
Design Bathymetry



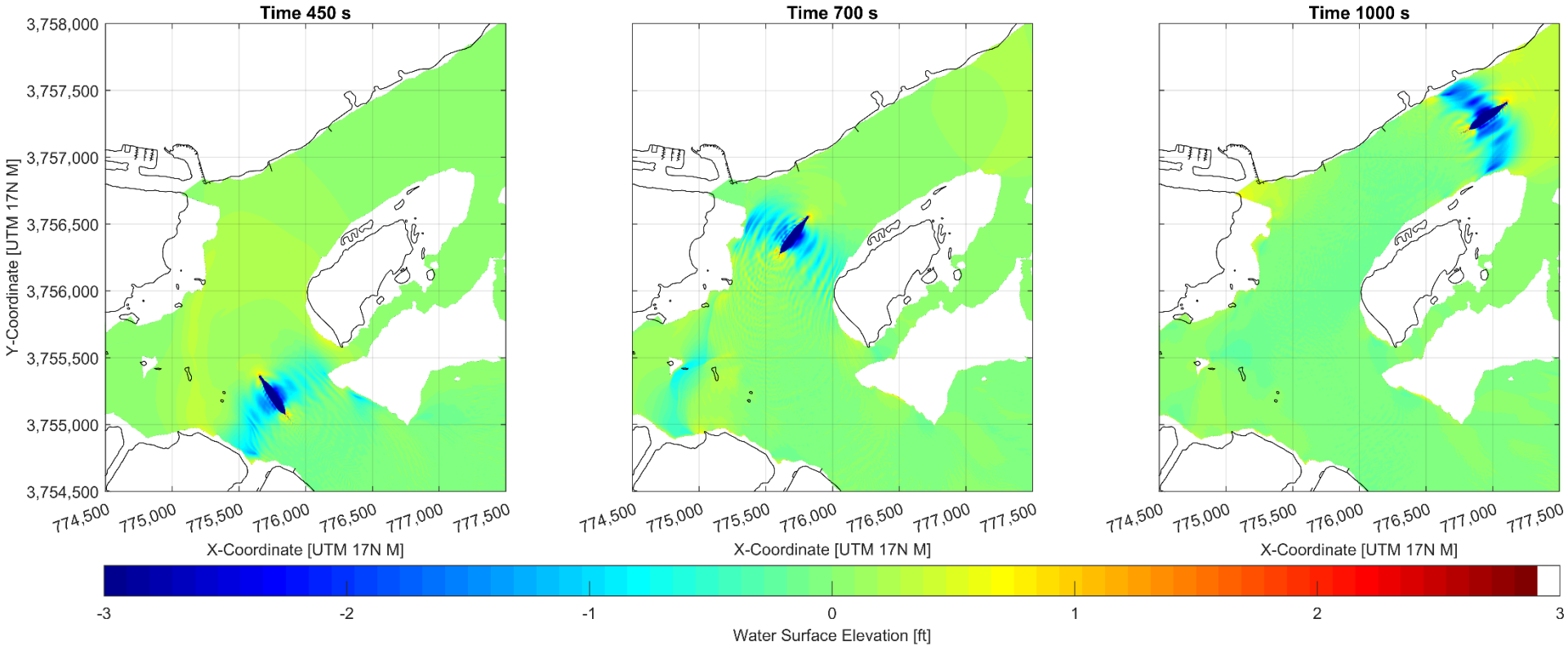
Vessel Track



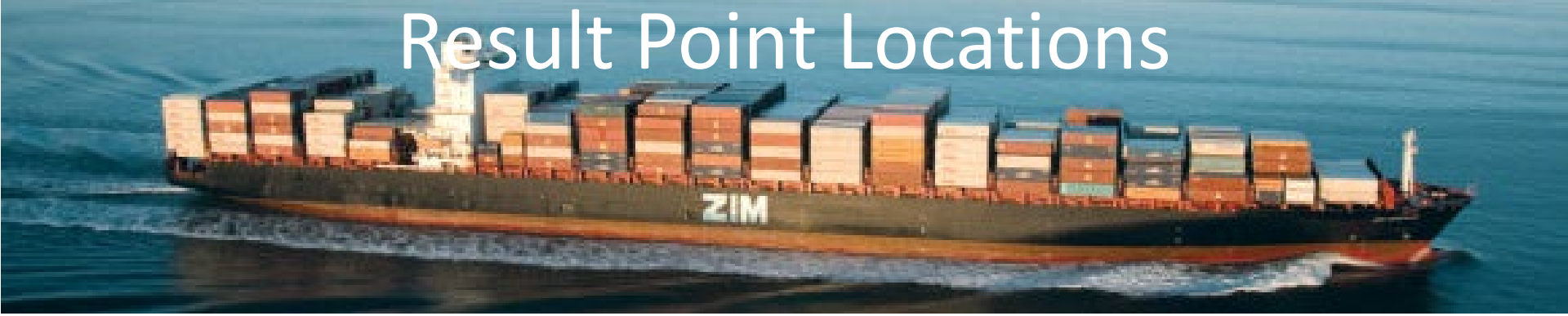
Vessel Track



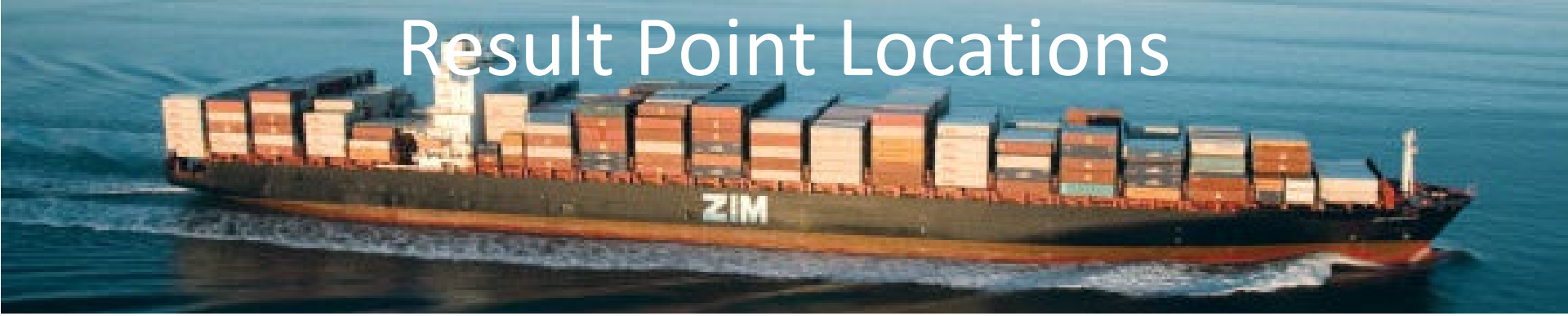
Typical Water Surface Elevation

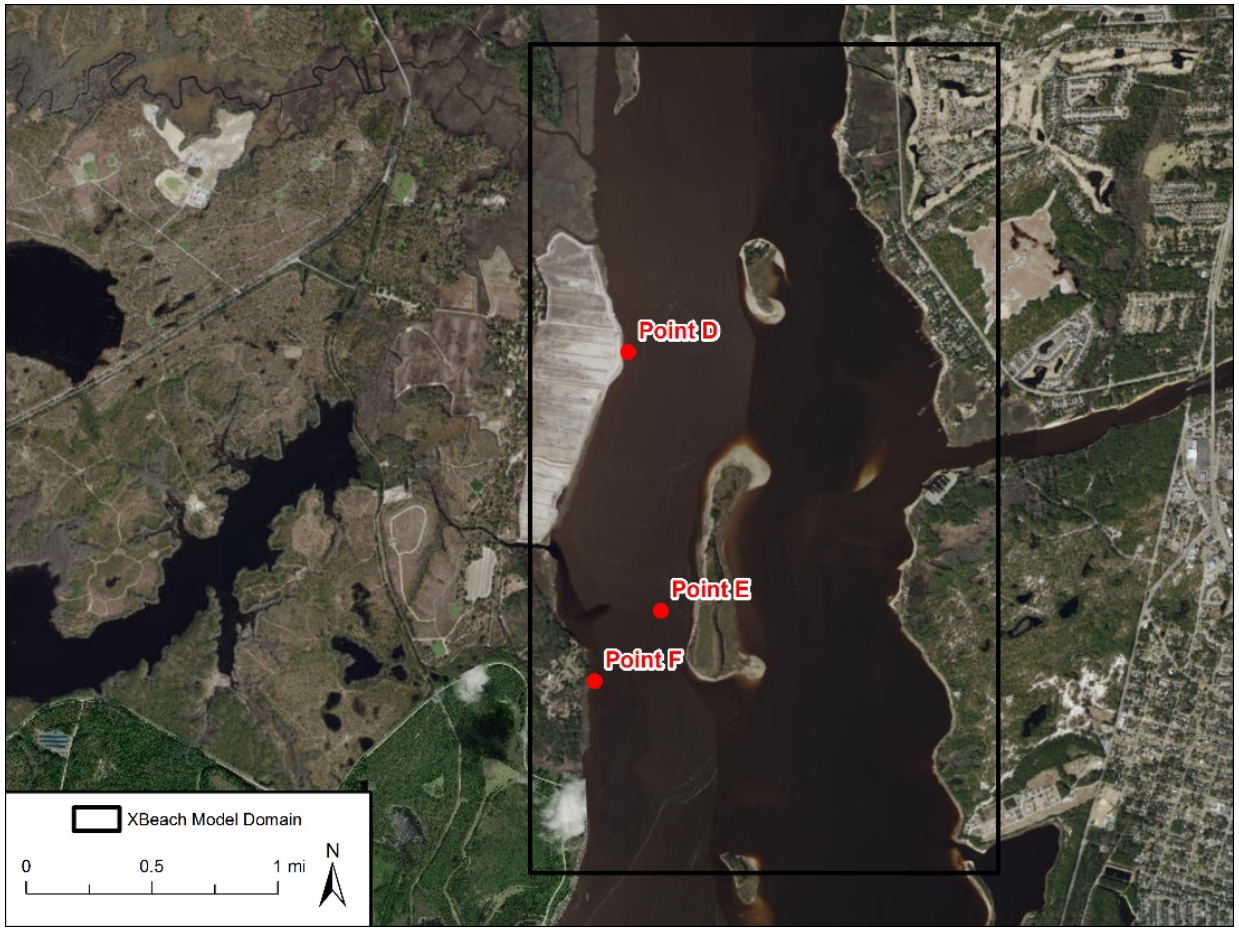


Result Point Locations

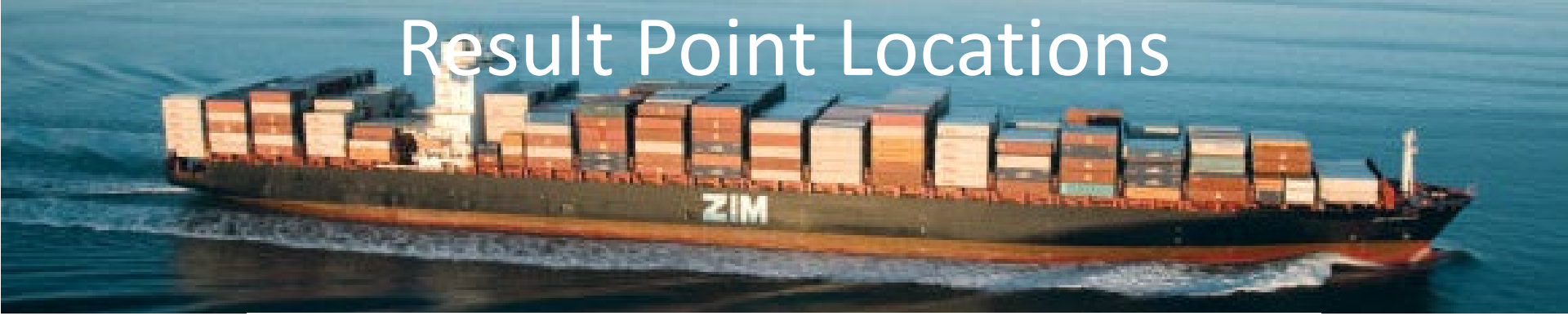


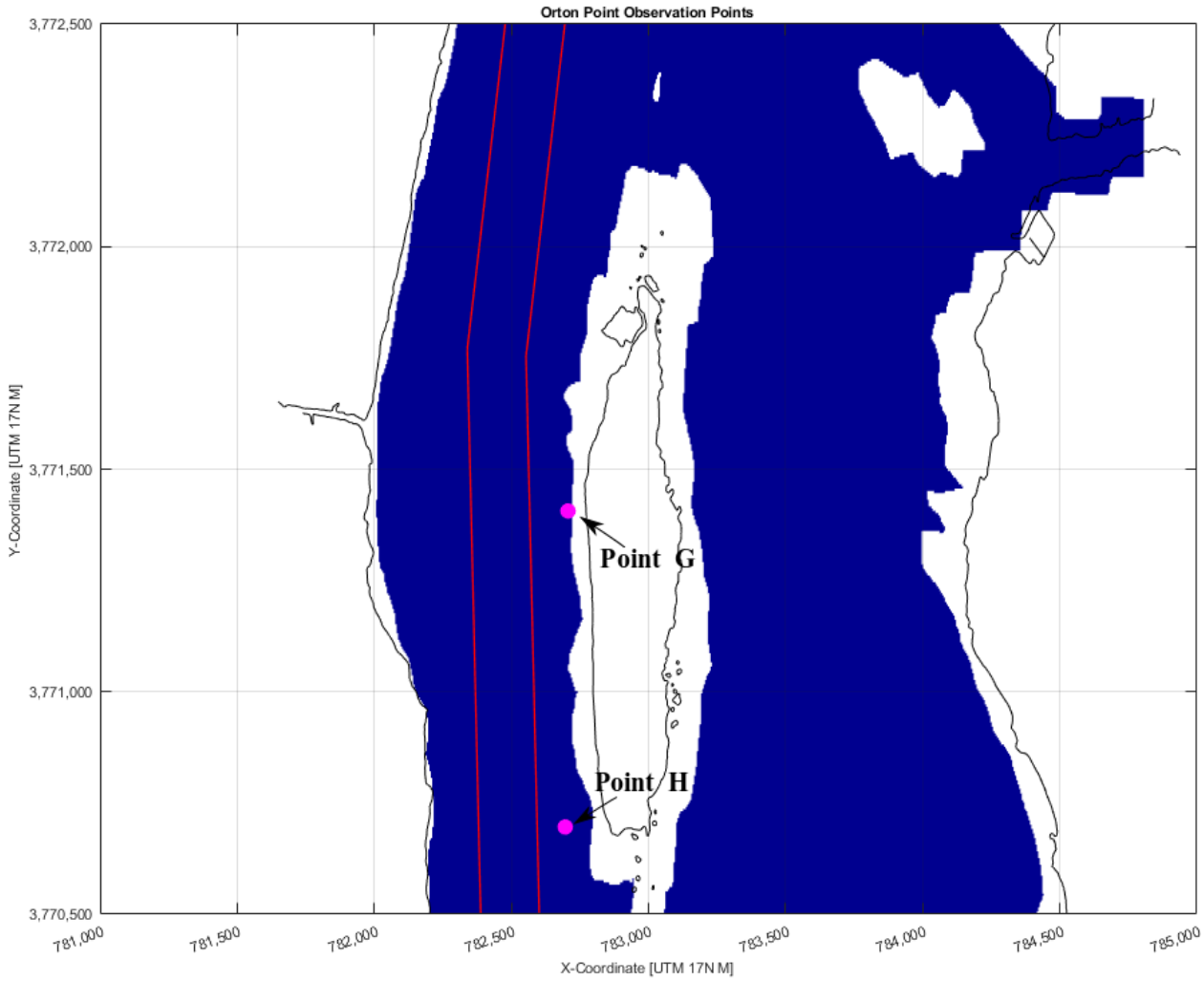
Result Point Locations



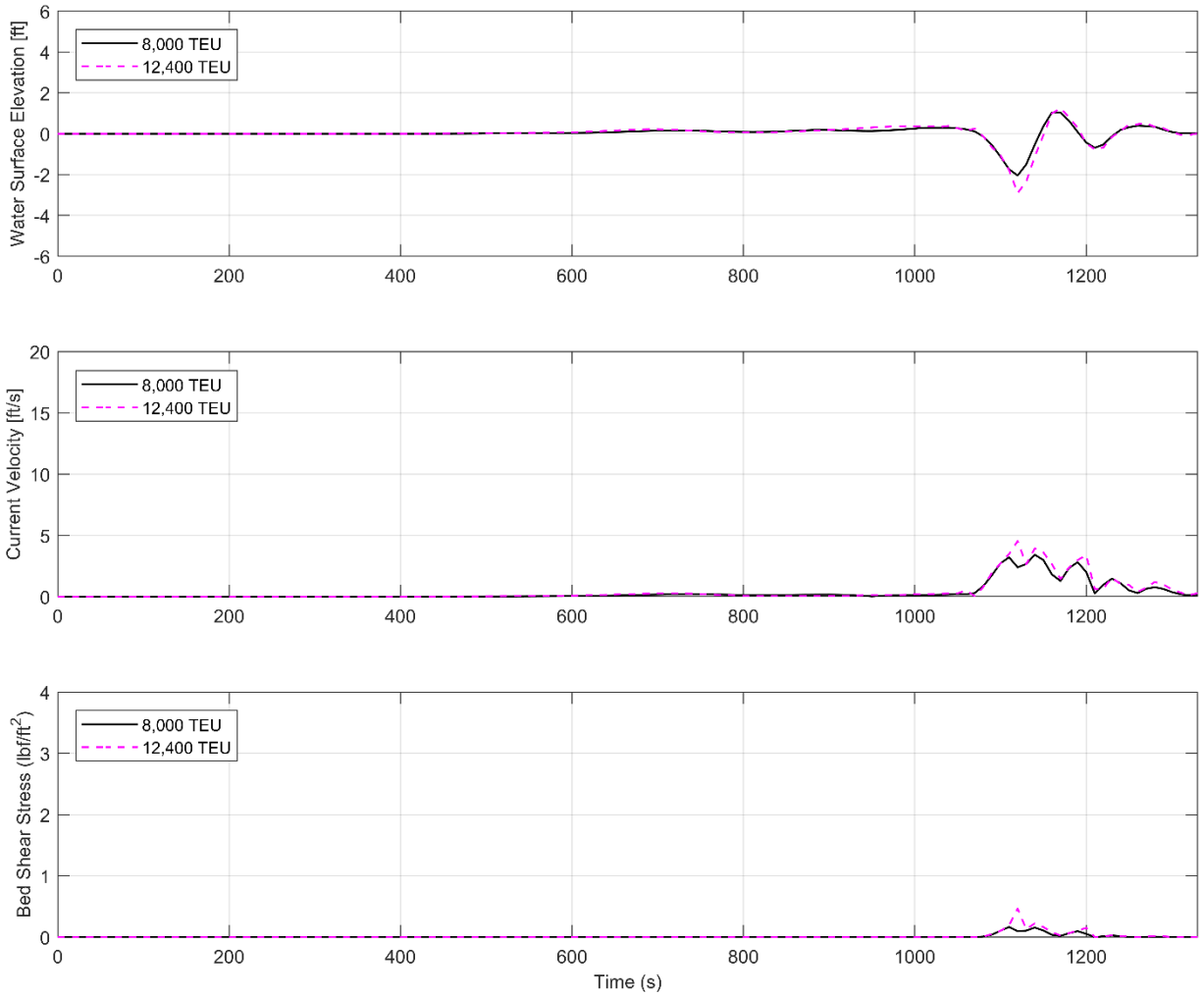


Result Point Locations

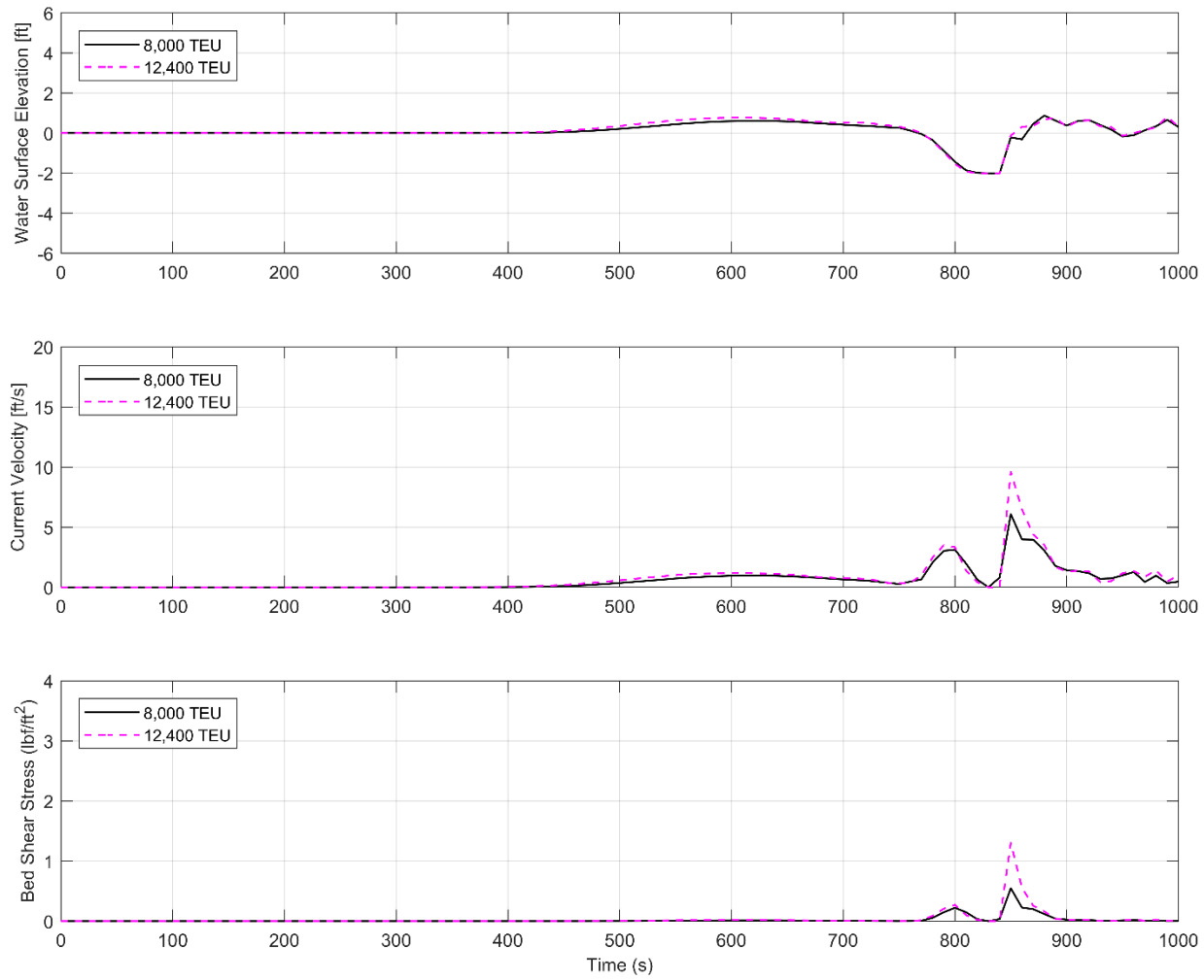




Point A - Inbound



Point F - Outbound



Southport and Battery Island Results

Point	Transit Direction	Change in Maximum Primary Wave Height^ $[\mathrm{ft}]$	Change in Maximum Current Velocity^ $\left[\frac{\mathrm{ft}}{\mathrm{s}}\right]$	Change in Maximum Bed Shear Stress^ $\left[\frac{\mathrm{lbf}}{\mathrm{ft}^2}\right]$
A	Inbound	+0.2	+1.1	+0.3
B		0.0	+0.8	+0.1
C		0.0	+1.0	+0.1
A	Outbound	+0.4	+2.5	+0.3
B		+0.1	+0.7	+0.2
C		+0.2	+0.3	0.0

^ Values reported are the 12,400 TEU minus the 8,000 TEU

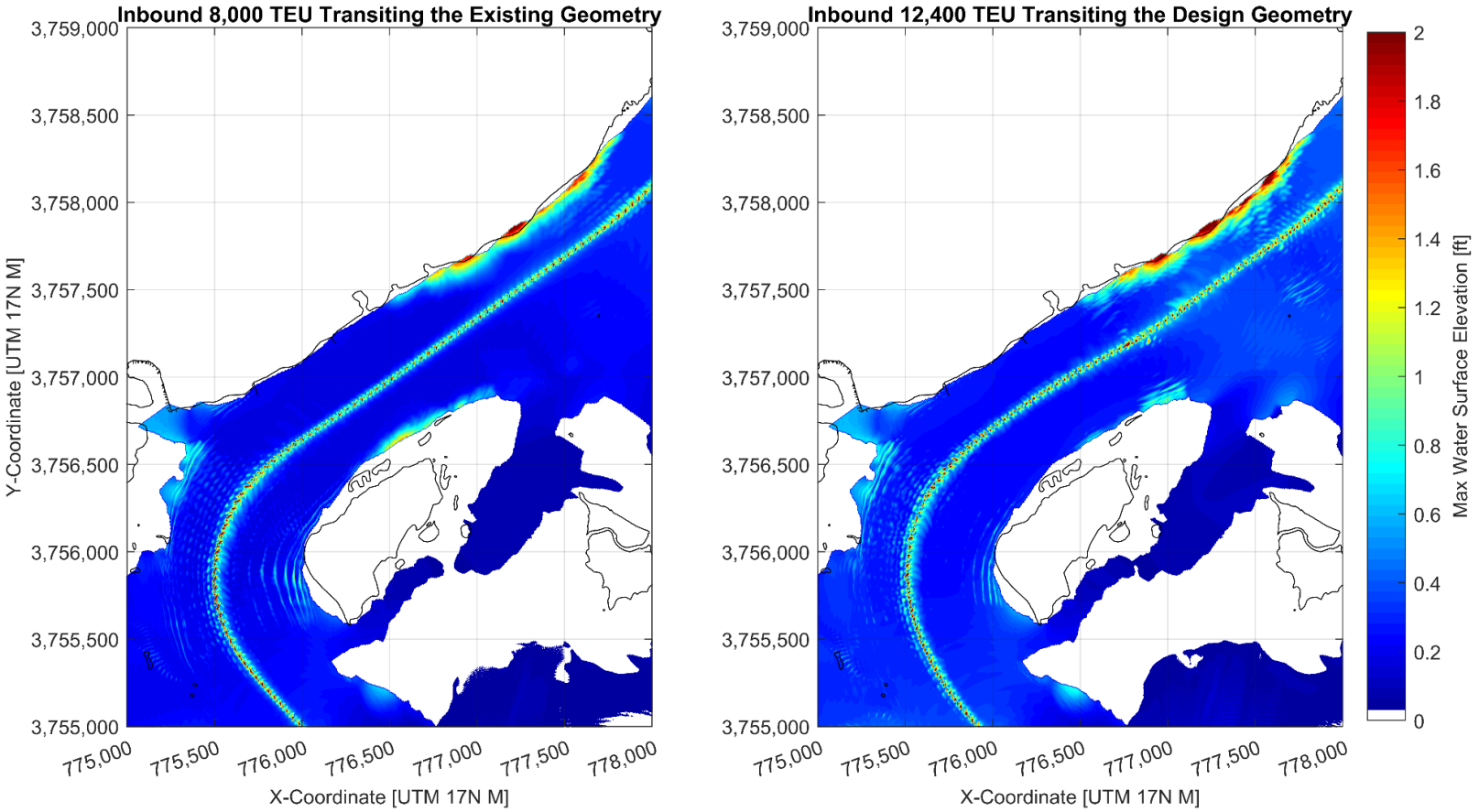
Orton Point Results

Point	Transit Direction	Change in Maximum Primary Wave Height^ $[\mathrm{ft}]$	Change in Maximum Current Velocity^ $\left[\frac{\mathrm{ft}}{\mathrm{s}}\right]$	Change in Maximum Bed Shear Stress^ $\left[\frac{\mathrm{lbf}}{\mathrm{ft}^2}\right]$
D	Inbound	0.0	+4.5	+1.5
E		+0.2	+3.3	+1.1
F		+0.2	+0.7	+0.1
D	Outbound	+0.6	+3.0	+0.5
E		0.0	+2.3	+0.6
F		-0.1	+3.5	+0.8
^ Values reported are the 12,400 TEU minus the 8,000 TEU				

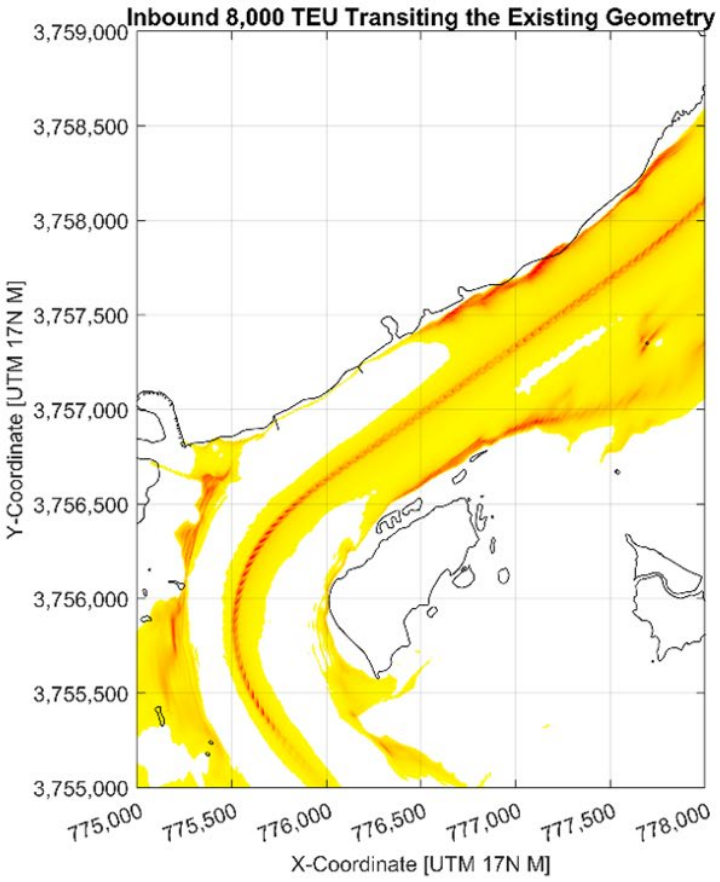
Island Results

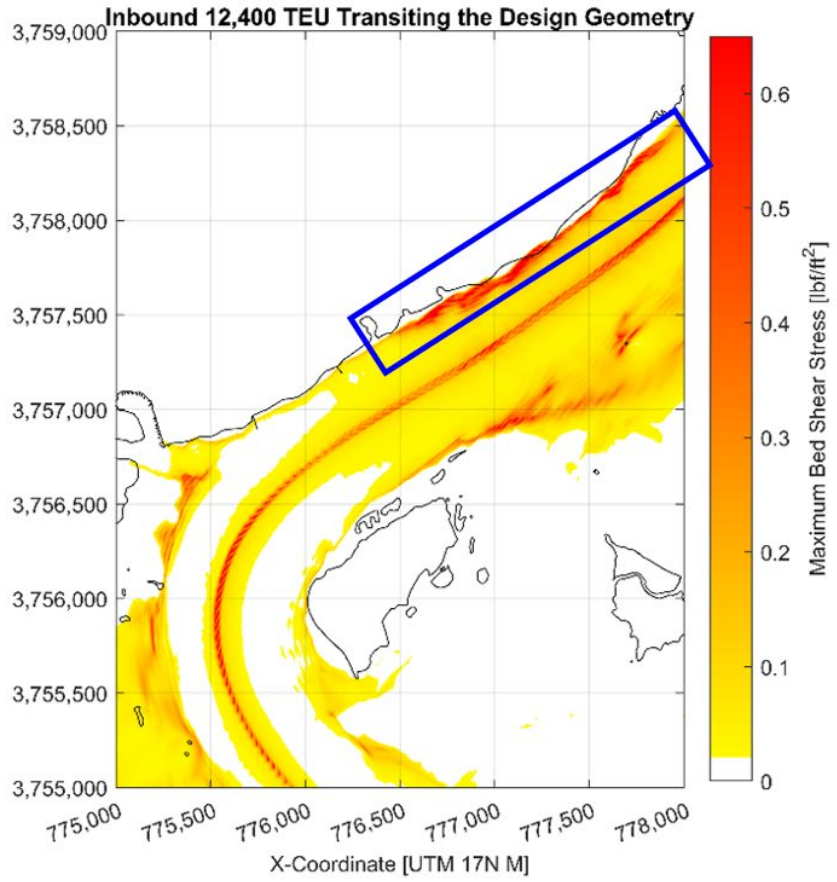
Point	Transit Direction	Change in Maximum Primary Wave Height^ $[\mathrm{ft}]$	Change in Maximum Current Velocity^ $\left[\frac{\mathrm{ft}}{\mathrm{s}}\right]$	Change in Maximum Bed Shear Stress^ $\left[\frac{\mathrm{lbf}}{\mathrm{ft}^2}\right]$
G	Inbound	-0.2	+0.9	+0.2
H		0.0	+2.8	+0.7
^ Values reported are the 12,400 TEU minus the 8,000 TEU				

Water Surface Elevation - Inbound

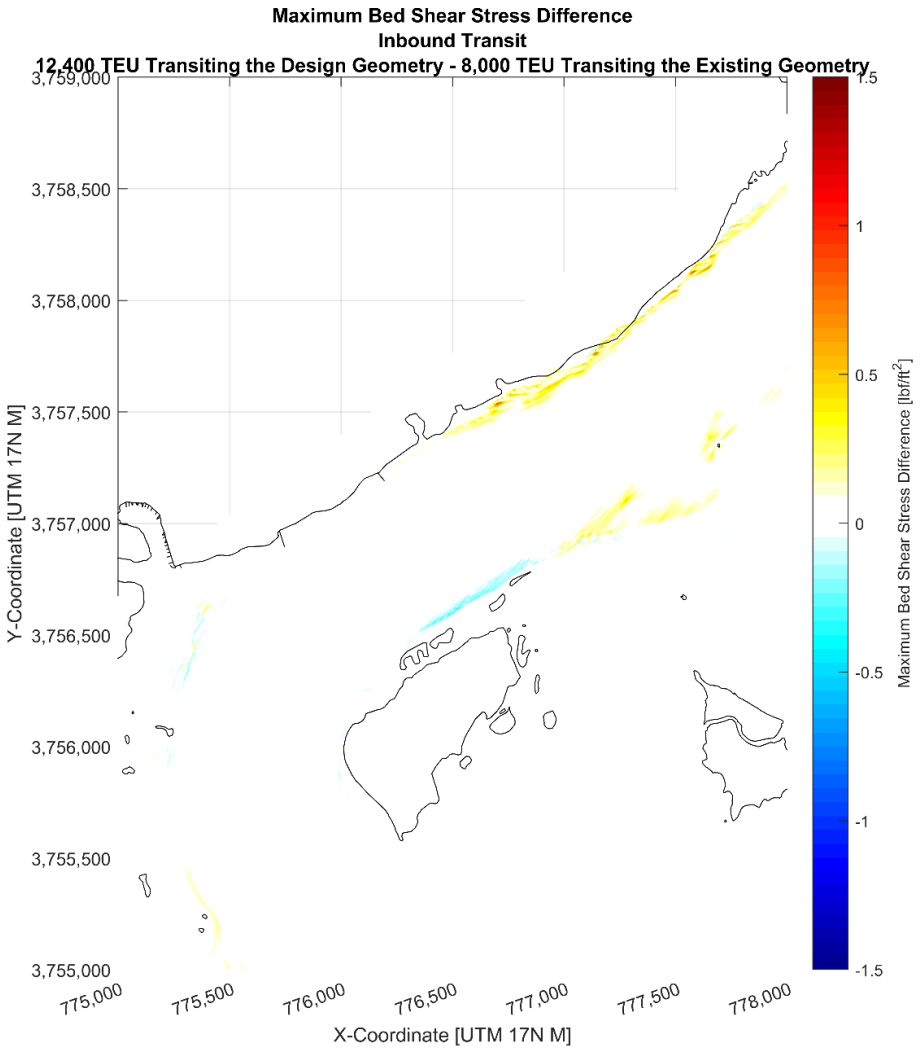


Bed Shear Stress - Inbound

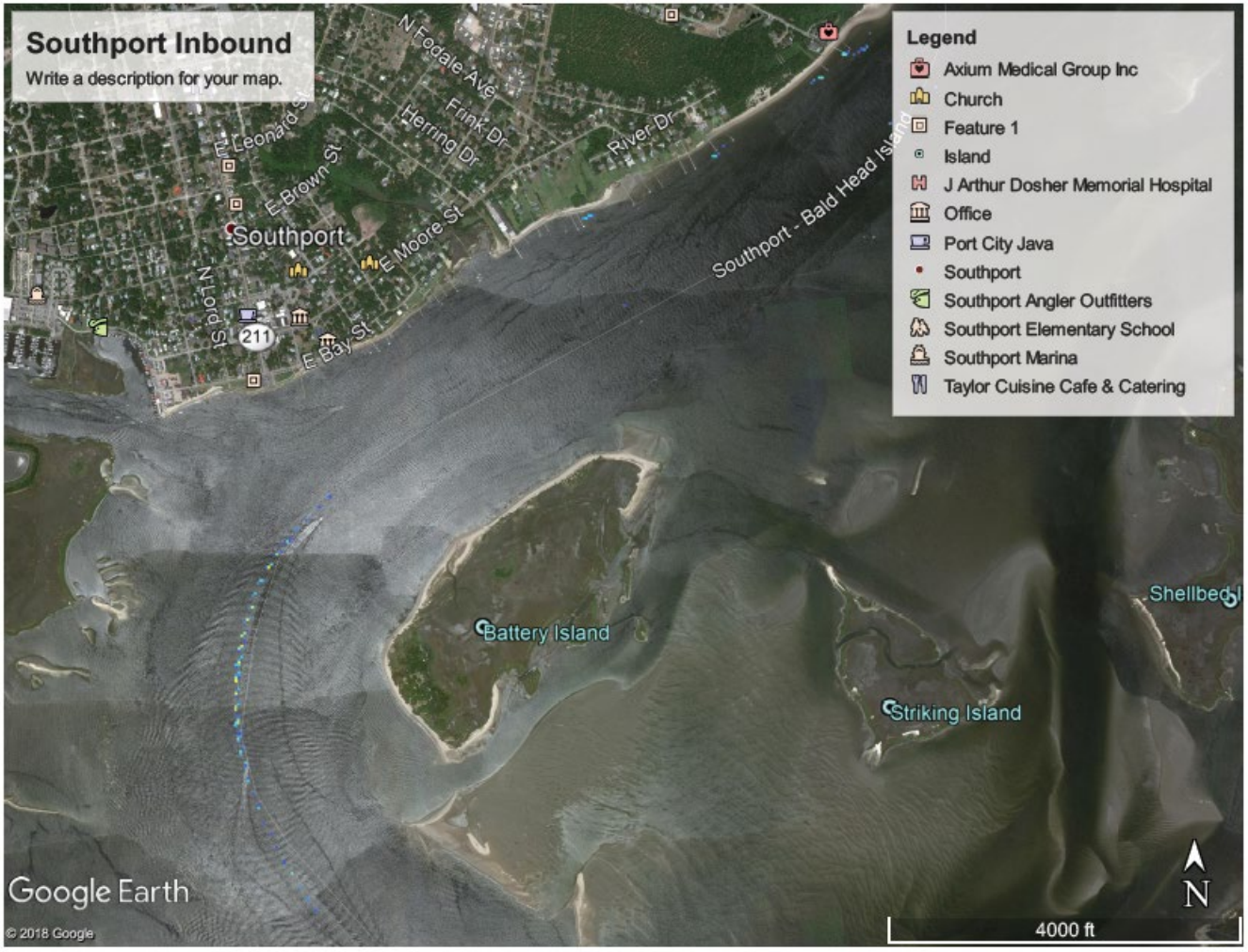




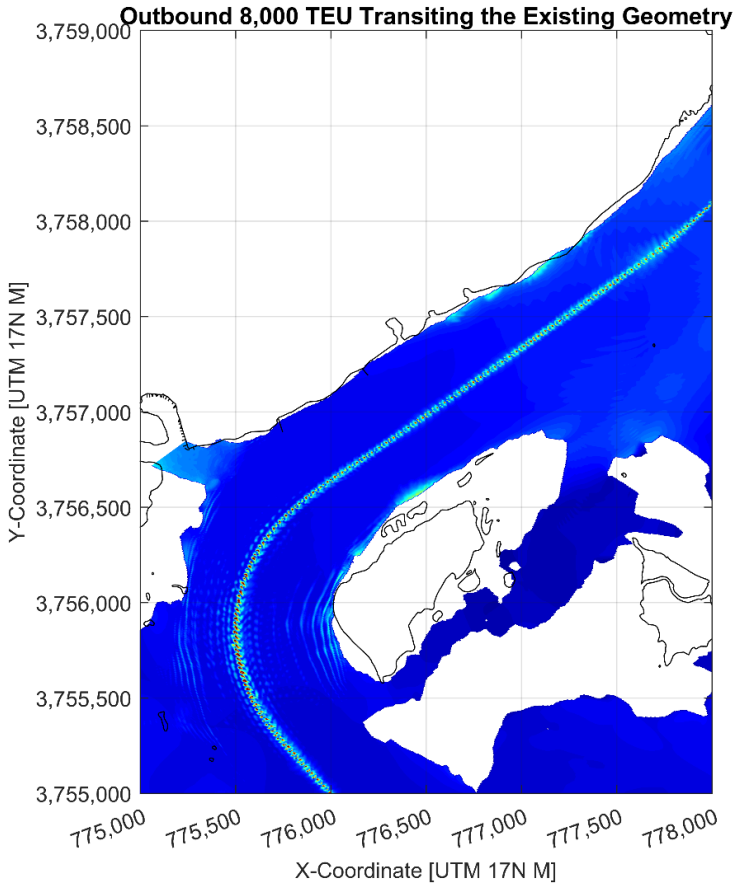
Bed Shear Stress Difference - Inbound

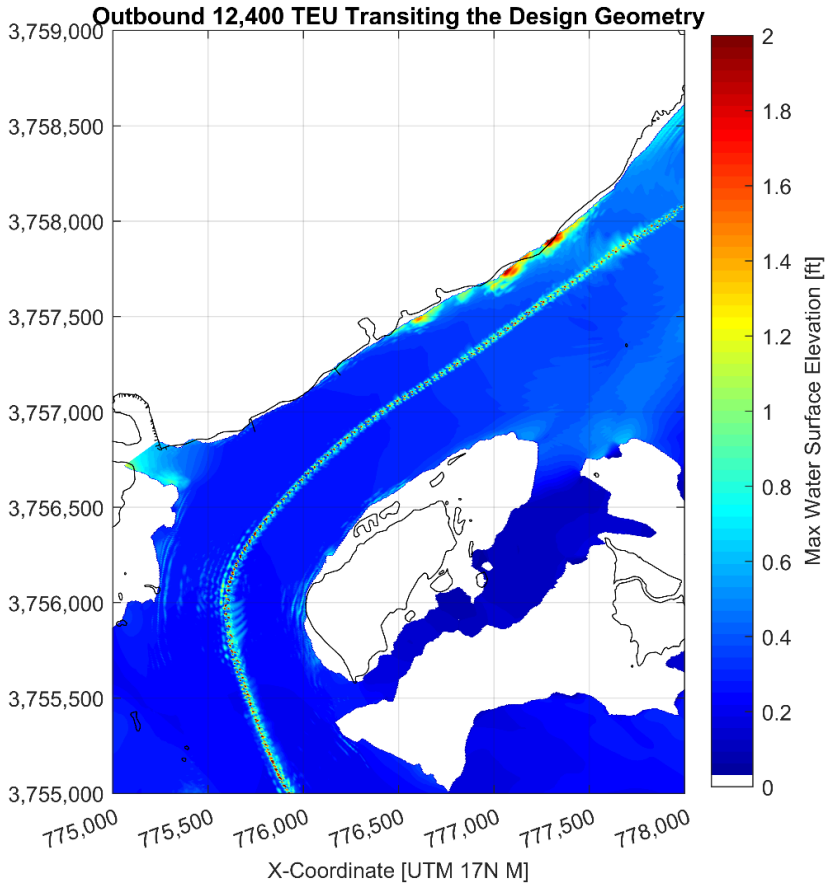


Bed Shear Stress Difference - Inbound

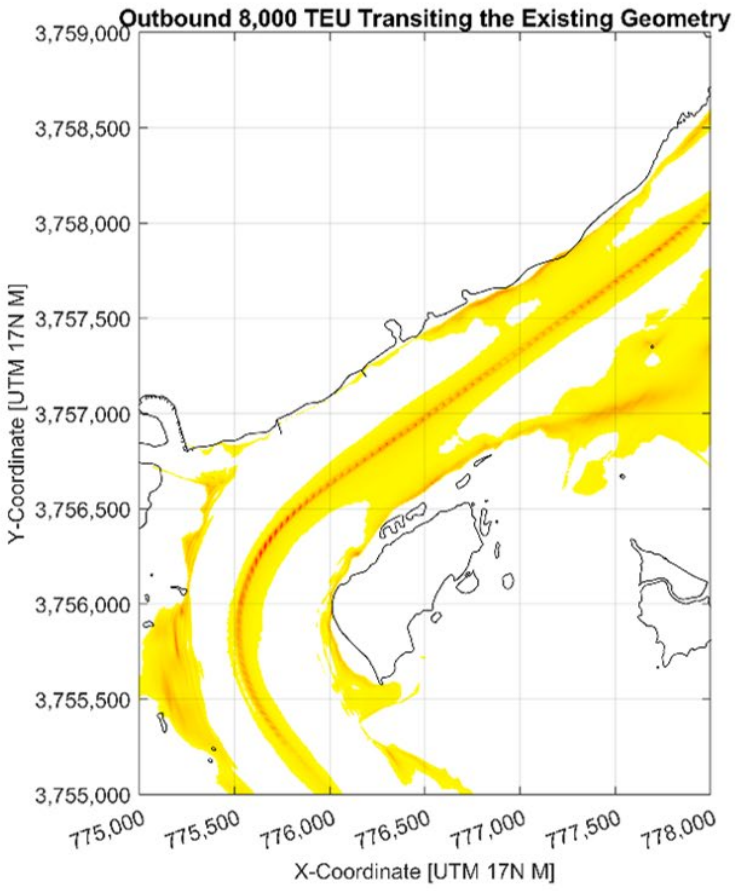


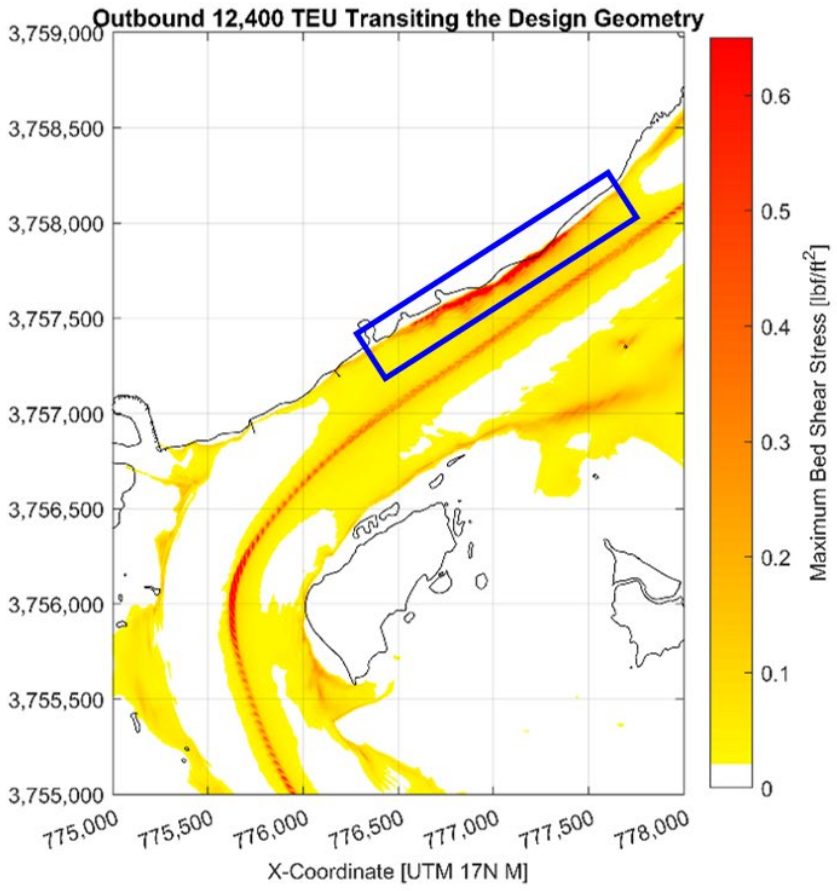
Water Surface - Outbound



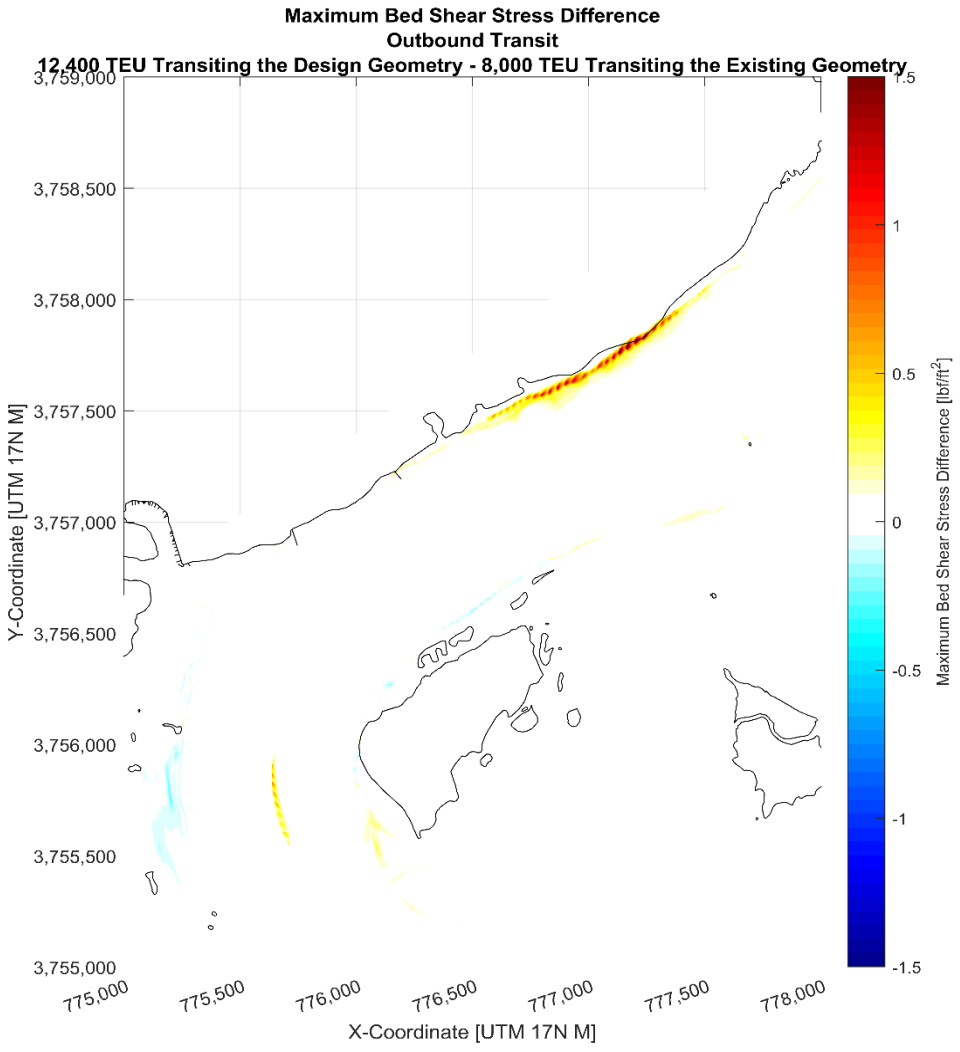


Bed Shear Stress - Outbound



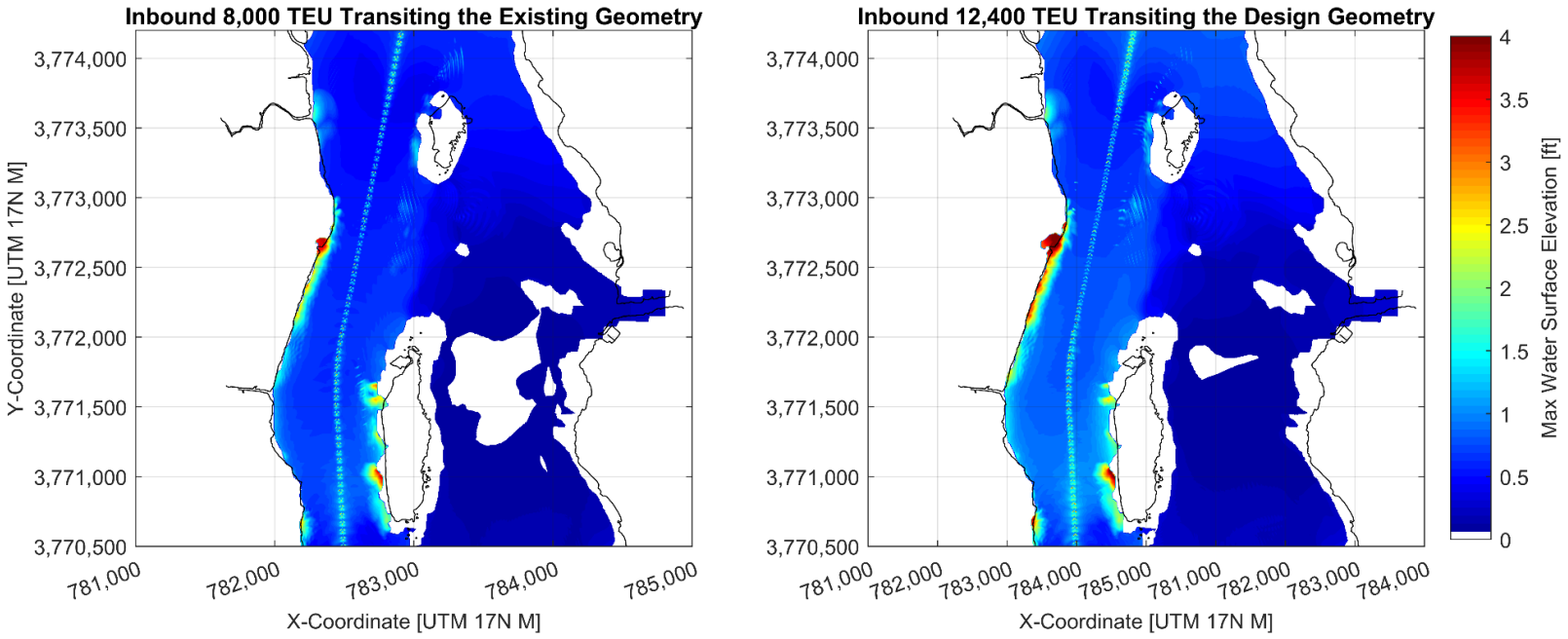


Bed Shear Stress Difference - Outbound

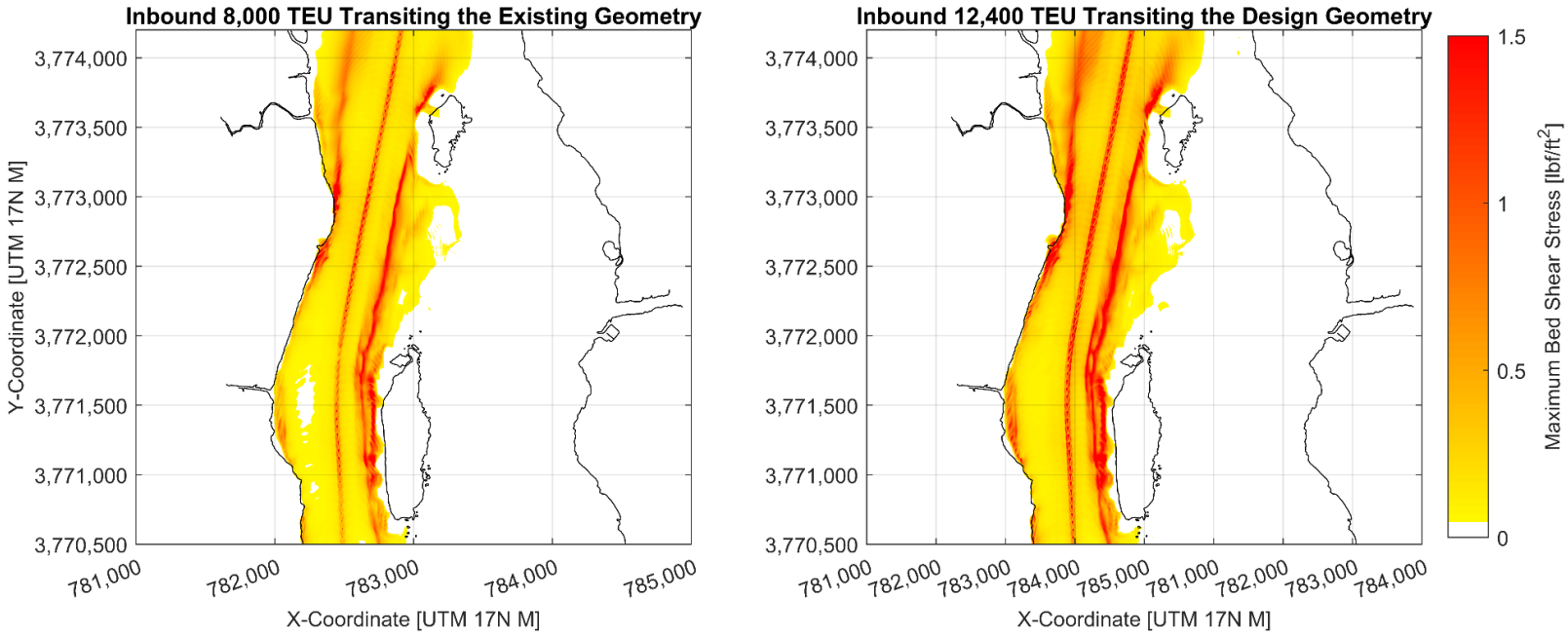


Bed Shear Stress Difference - Outbound

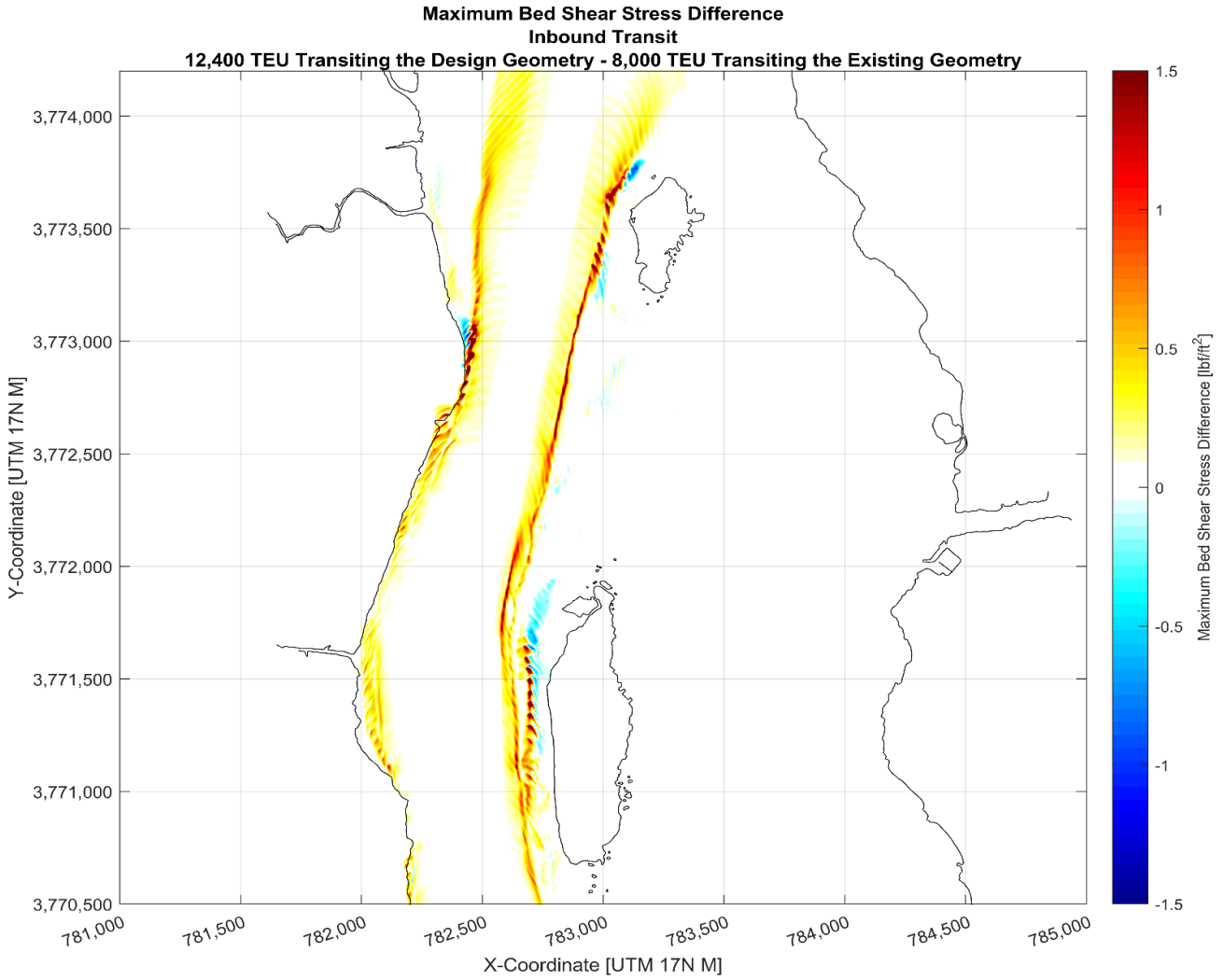
Water Surface - Inbound



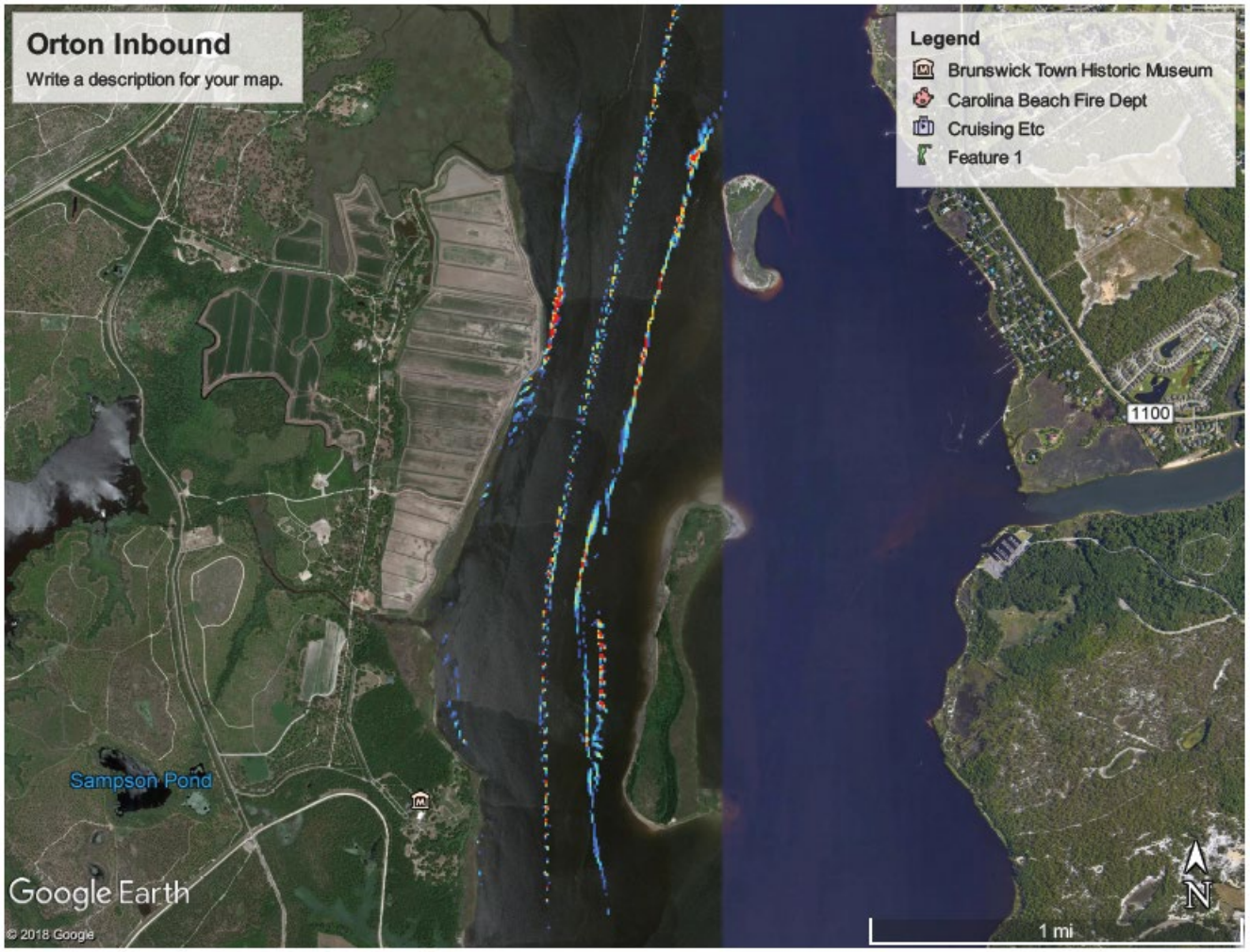
Bed Shear Stress Difference - Inbound



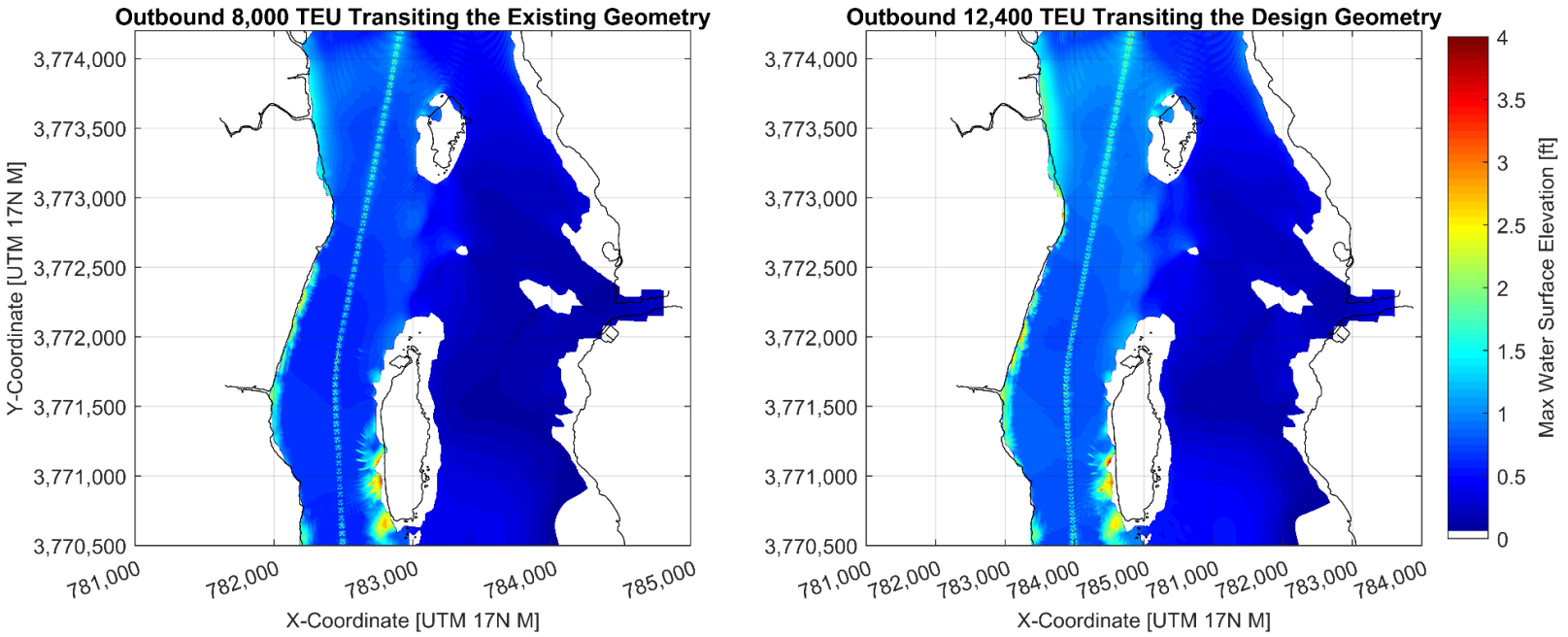
Bed Shear Stress Difference - Inbound



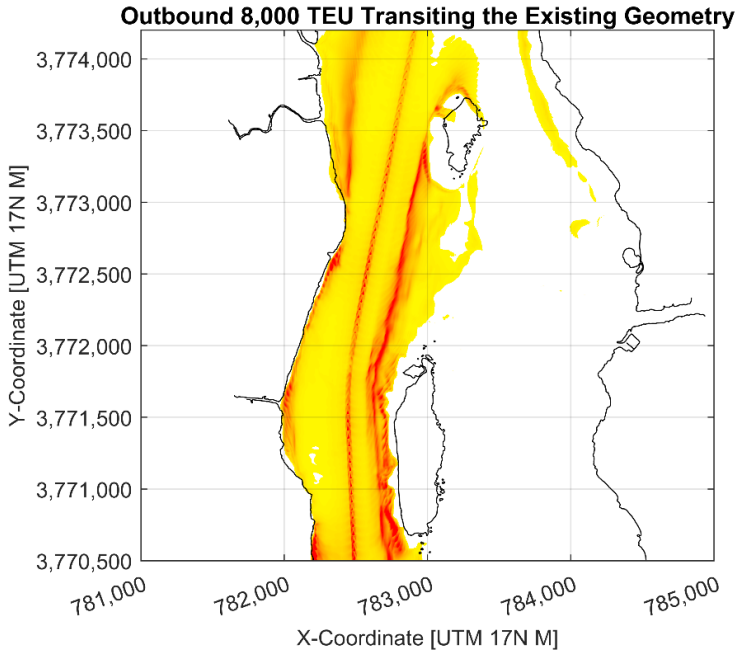
Bed Shear Stress Difference - Inbound

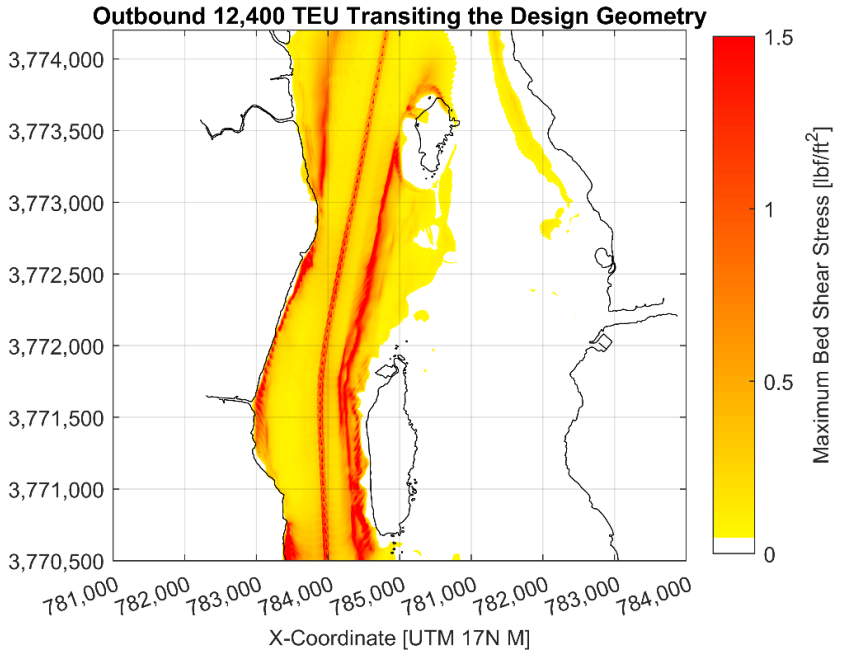


Water Surface Elevation - Outbound

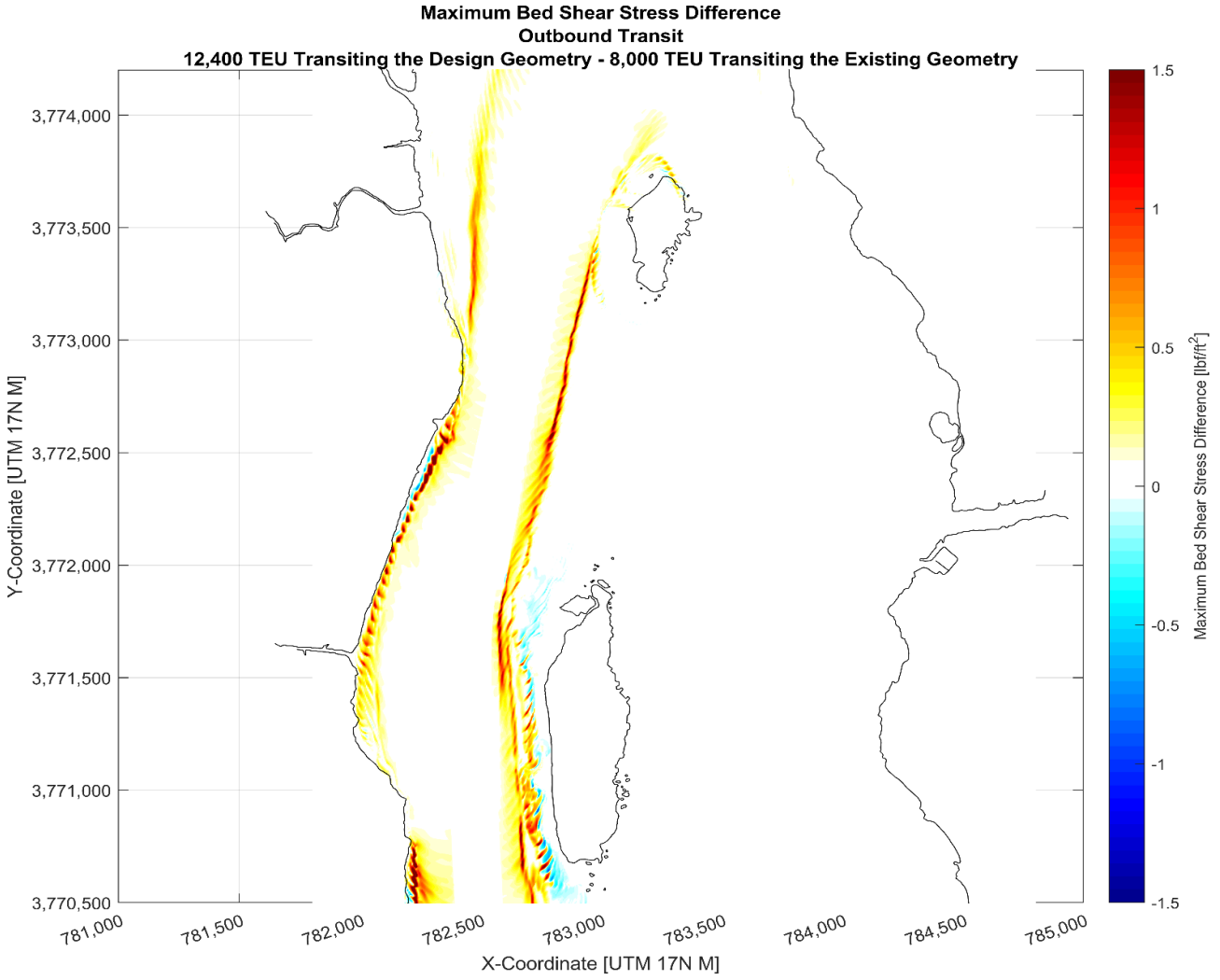


Bed Shear Stress - Outbound

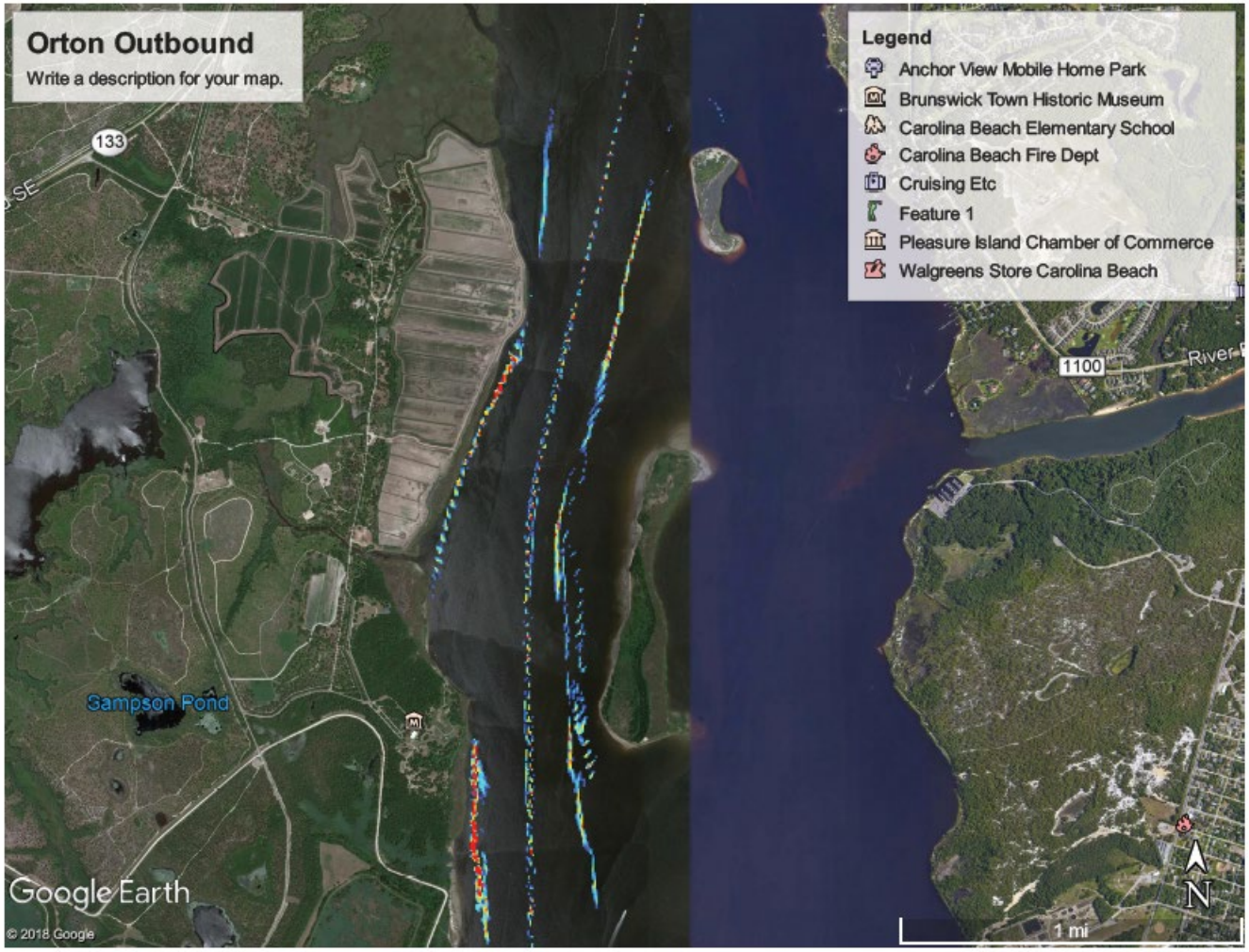




Bed Shear Stress Difference - Outbound



Bed Shear Stress Difference - Outbound



Summary of Results

Southport

- Minimal differences occurred in water levels and bed shear stresses for Southport's shoreline.
- Increases in water levels and bed shear stresses occurred along the shoreline northeast of Southport.

Summary of Results

Battery Island

- For inbound transits, minimal differences occurred in the water levels and bed shear stresses with the exception of its northernmost shoreline.
- For inbound transits there was a decrease in water levels and bed shear stresses along the northernmost shoreline due to the new design track being further from this shoreline.
- For outbound transits there was a slight increase in bed shear stresses along the southern most coastline of Battery Island.

Summary of Results

Orton Point

- There was an increase in water levels and bed shear stresses along the shorelines adjacent to the navigation channel.

Islands Adjacent to the Channel

- A small general increase in bed shear stress occurred but was geographically dependent.

Conclusion

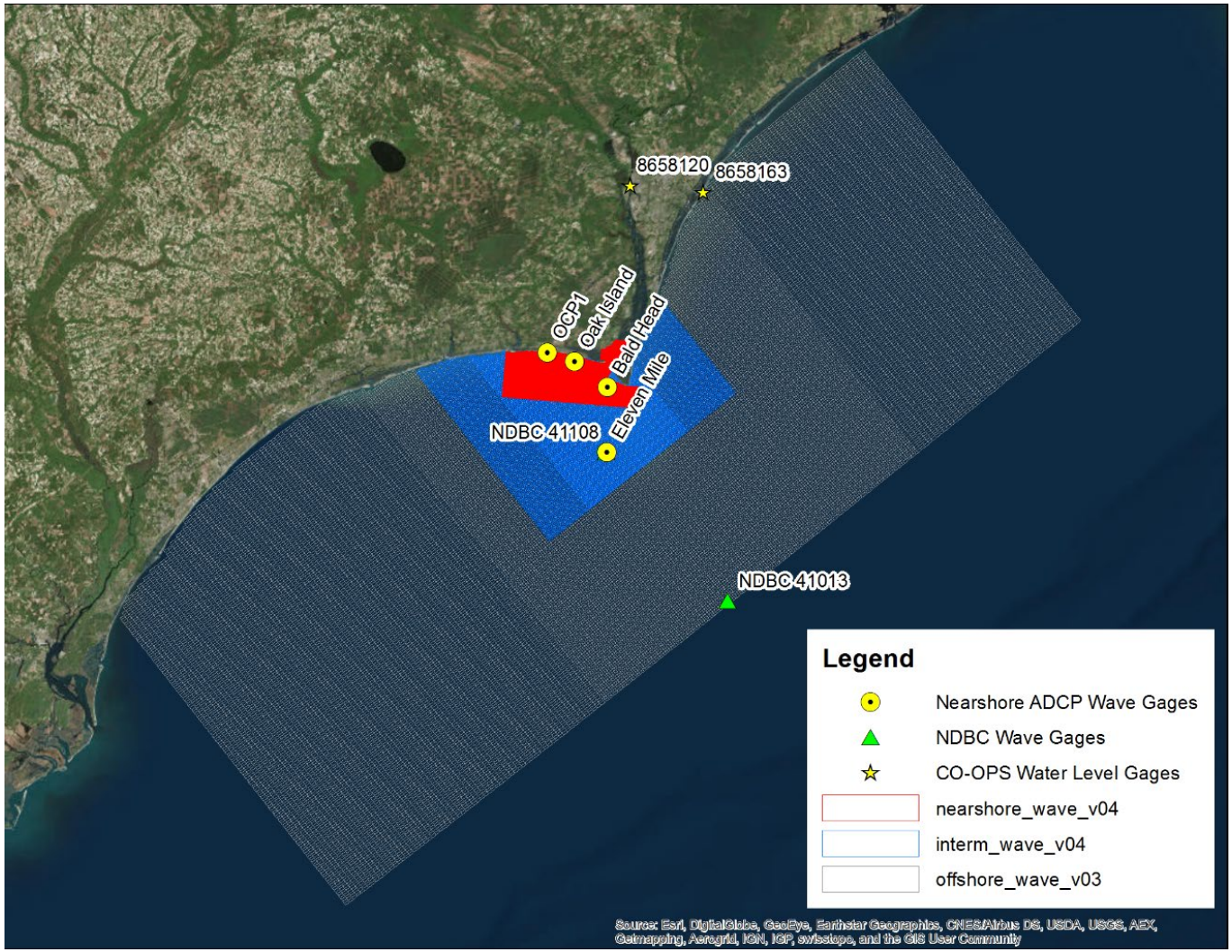
- Orton Point And The Shoreline Northeast Of Southport Are Areas Of Concern.
- Minimal Impacts Are Expected Due To The Proposed Project To Battery Island Or The Islands Adjacent to the Channel.

Conclusion

- Additional More Detailed Analyses Will Be Performed During The Pre-Construction Engineering And Design (PED) Phase Of The Project To Collect Field Data And Document The Existing Conditions And Further Quantify Impacts.
- These Analyses Will Then Be Incorporated Into The Design Of Mitigative Measures.

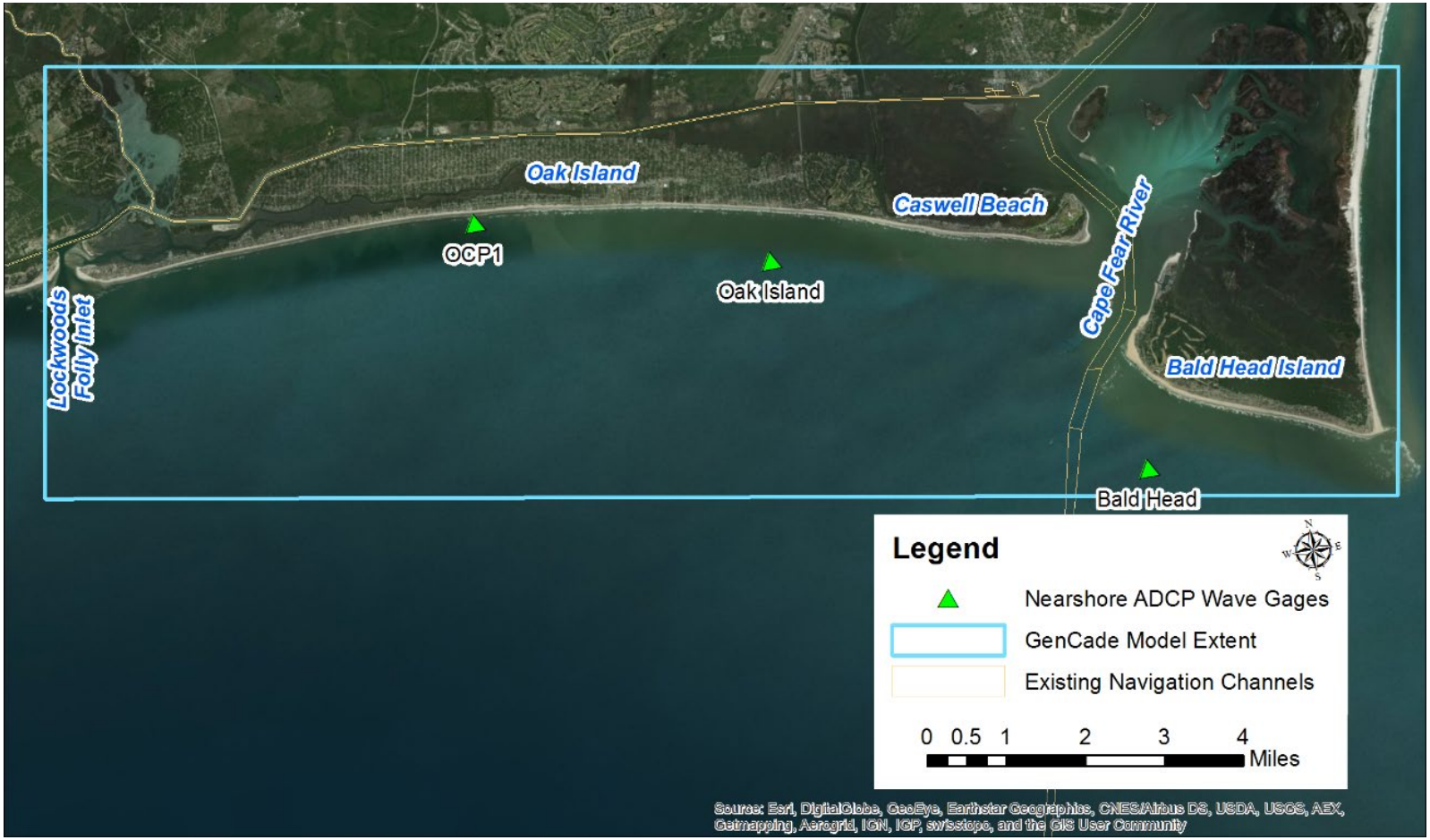
Wave Model Grids and Gage Locations

Port of Wilmington



GENCADE Model Extents

Port of Wilmington



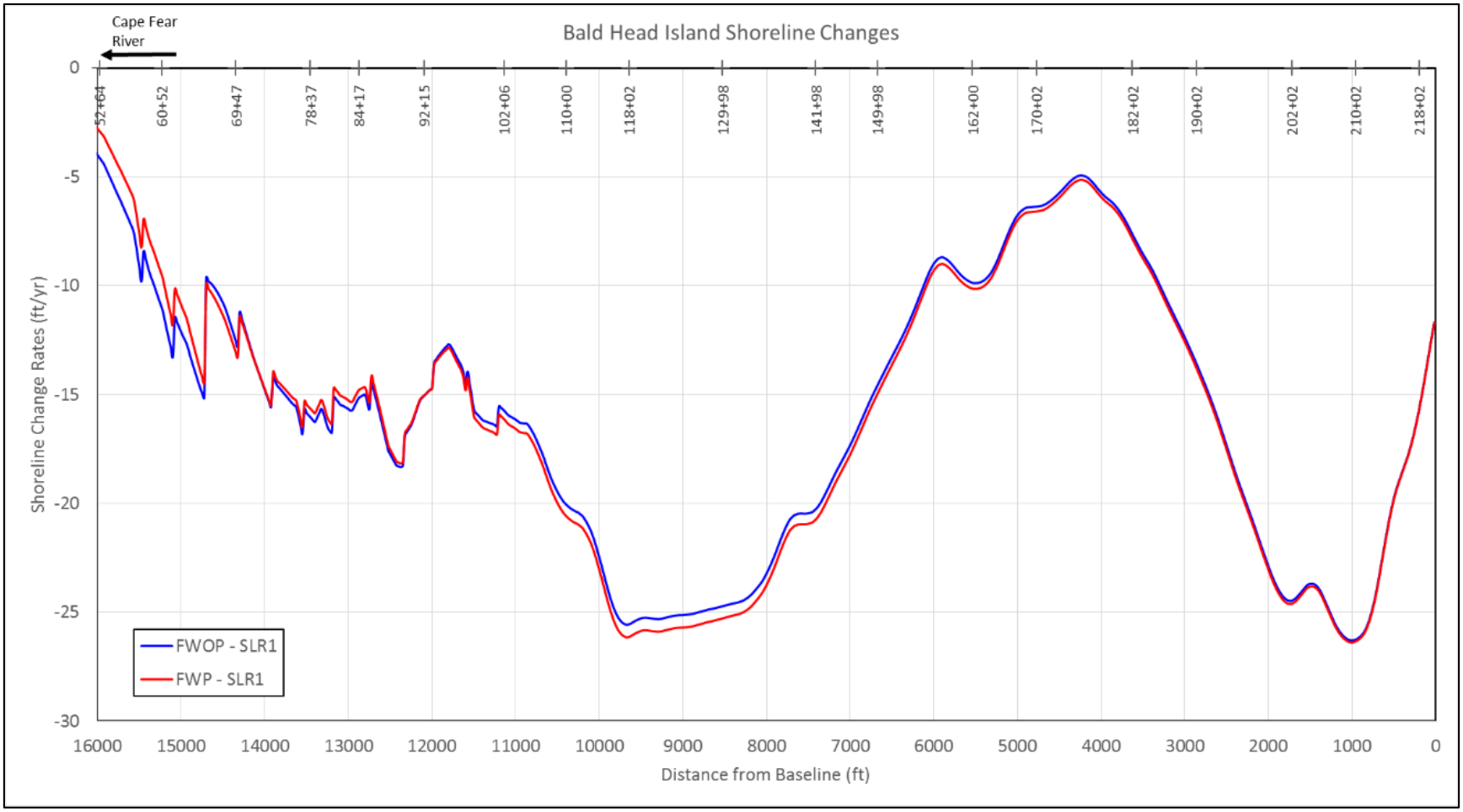
Wave Model Results

Wave Model Results

Station	25% H_s			50% H_s (mean)			75% H_s			99% H_s		
	FwoP	FwP	**FwP-FwoP**	FwoP	FwP	**FwP-FwoP**	FwoP	FwP	**FwP-FwoP**	FwoP	FwP	**FwP-FwoP**
gencabh01	0.76	0.76	**0.00**	1.04	1.05	**0.01**	1.49	1.49	**0.00**	3.09	3.10	**0.01**
gencabh02	0.71	0.72	**0.01**	1.06	1.06	**0.00**	1.55	1.56	**0.01**	3.22	3.23	**0.01**
gencabh03	0.70	0.70	**0.00**	1.06	1.06	**0.00**	1.63	1.63	**0.00**	3.40	3.42	**0.02**
gencabh04	0.73	0.73	**0.00**	1.13	1.13	**0.00**	1.75	1.75	**0.00**	3.80	3.83	**0.03**
gencabh05	0.76	0.77	**0.01**	1.18	1.20	**0.02**	1.83	1.84	**0.01**	4.11	4.18	**0.07**
gencabh06	0.75	0.75	**0.00**	1.18	1.20	**0.02**	1.85	1.86	**0.01**	4.16	4.16	**0.00**
gencabh07	0.80	0.81	**0.01**	1.27	1.27	**0.00**	1.90	1.90	**0.00**	4.28	4.26	**-0.02**
gencade30	0.46	0.46	**0.00**	0.81	0.80	**-0.01**	1.51	1.52	**0.01**	3.23	3.22	**-0.01**
gencade33	0.53	0.52	**-0.01**	0.91	0.91	**0.00**	1.60	1.61	**0.01**	3.41	3.41	**0.00**
gencade04	0.55	0.55	**0.00**	0.96	0.95	**-0.01**	1.69	1.69	**0.00**	3.60	3.61	**0.01**
gencade05	0.61	0.61	**0.00**	1.06	1.06	**0.00**	1.84	1.84	**0.00**	3.95	3.95	**0.00**
gencade55	0.67	0.67	**0.00**	1.13	1.13	**0.00**	1.91	1.91	**0.00**	4.10	4.09	**-0.01**
gencade06	0.69	0.69	**0.00**	1.17	1.17	**0.00**	1.94	1.94	**0.00**	4.04	4.04	**0.00**
gencade07	0.74	0.73	**-0.01**	1.25	1.25	**0.00**	2.02	2.02	**0.00**	4.33	4.33	**0.00**
gencade08	0.83	0.83	**0.00**	1.35	1.35	**0.00**	2.06	2.06	**0.00**	4.34	4.34	**0.00**

Bald Head Island Shoreline Results

Port of Wilmington

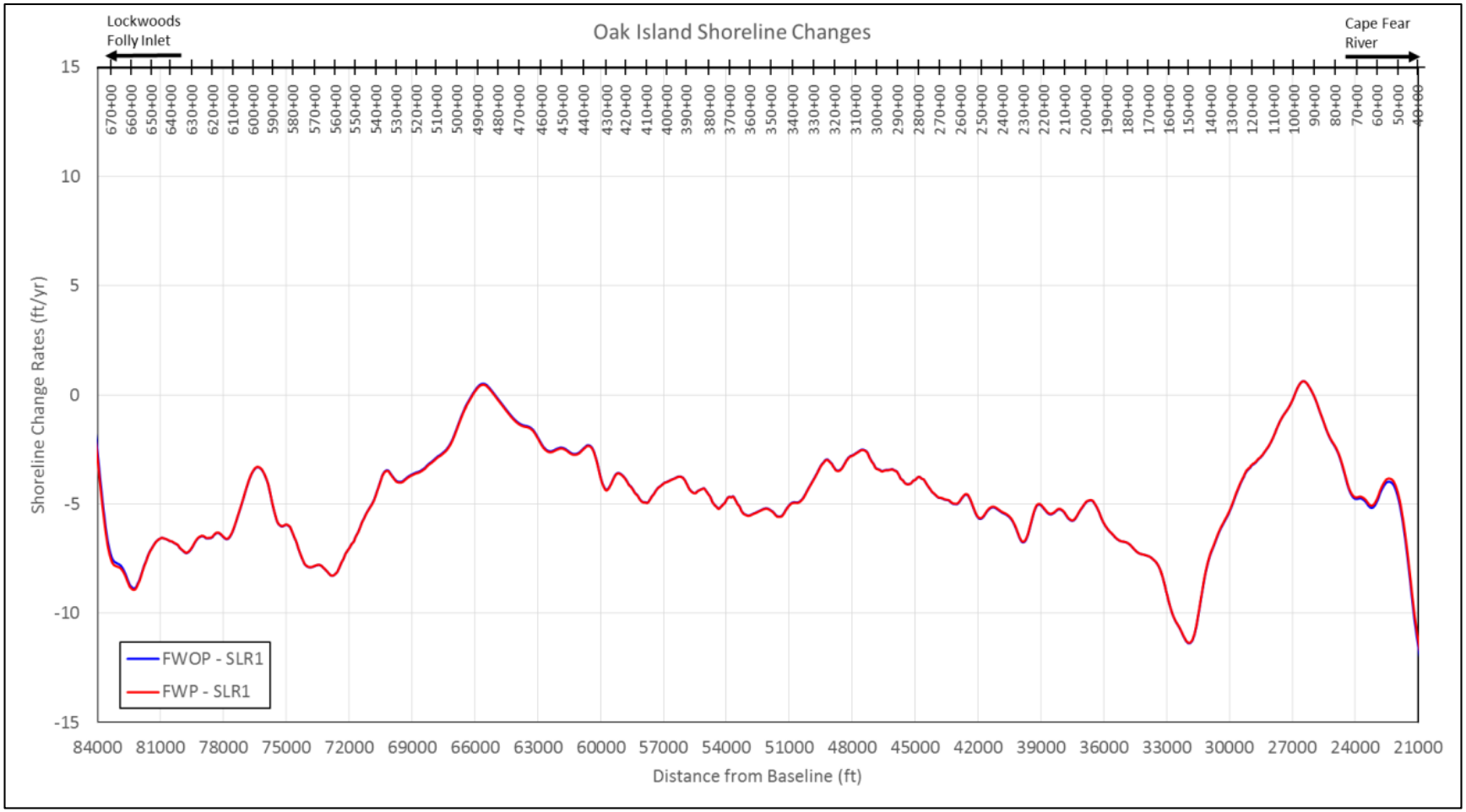


Bald Head Island Shoreline Results

Port of Wilmington

Oak Island Shoreline Results

Port of Wilmington



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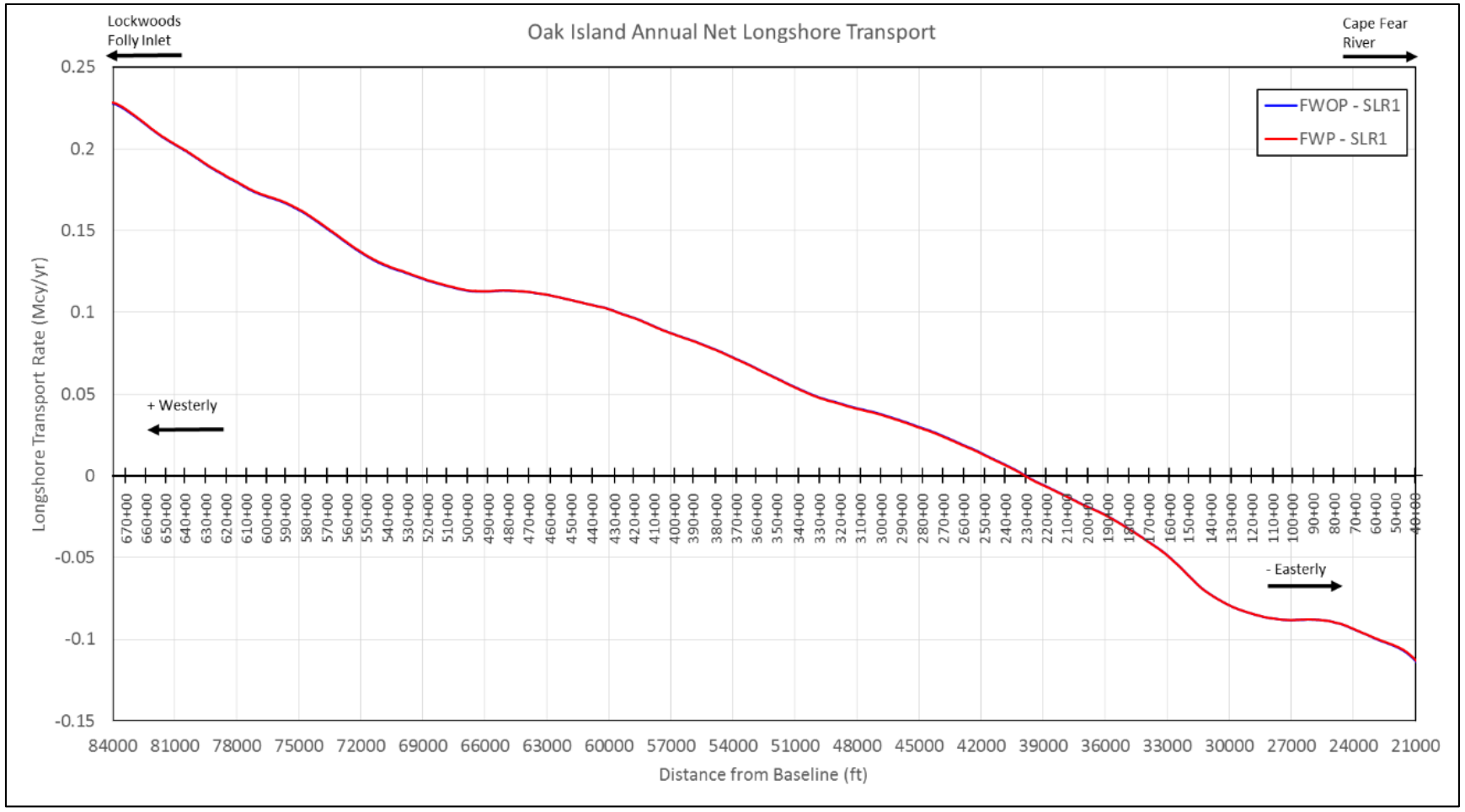
Port of Wilmington



Bald Head Shoreline Results Summary

- Minimal Impacts On The Central South Beach Shoreline; With Erosion Rates Only As Much As 0.6 Ft/Yr Higher
- Minimal Favorable Impacts On The Western End Of The South Beach Shoreline, With An Average Of 1.3ft/Yr Less Erosion
- The Project Could Result In Westerly Longshore Transport Rate Increases By As Much As 3,800 Cy/Yr
- Given The Model Uncertainties, These Potential Changes Should Be Considered Minimal At Best.

Oak Island Shoreline Results Summary

- Oak Island/Caswell Beach Shoreline Change Rates (Including Existing "Hot Spots") Would Be Negligible; Less Than 0.1ft/Yr Difference Over Most Of The Island And A Slight Reduction Of 0.2 Ft/Yr In Erosion At The Eastern End Of Caswell Beach.
- The Longshore Sediment Transport Rate Results Also Suggest Negligible Impacts Due To The Project.